

मध्य रेल



ई-निविदा क्रमांक – भुसावल-एल-डब्लू-टी-49-2026

कार्य का नाम

Name of work – Electrification work in connection with provision of pathway in Bhusawal, Badnera, Nandgaon, and Khandwa yard.

टेण्डर जारी किया :

टेण्डर दिया गया :

वरिष्ठ मंडल विद्युत अभियंता (सामान्य), मध्य रेल, भुसावल	मेसर्स _____ _____ _____
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E-Tender No:-BSL-L-W-T-49-2026

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CENTRAL RAILWAY

E-TENDER NOTICE NO BSL-L-W-T-49-2026 (ELECT. GEN) OPEN TENDER

Senior Divisional Electrical Engineer (General Services) Central Railway, Bhusawal for & on behalf of President of India invites **E-TENDER** from reputed & experienced contractors on website www.ireps.gov.in for the following work –

SN	Tender No.	Description of work	Approx. Cost Rs.	Bid Security	Validity of offer	Completion period
1	BSL-L-W-T-49-2026	Electrification work in connection with provision of pathway in Bhusawal, Badnera, Nandgaon, and Khandwa yard.	1,42,17,741	2,84,400	60 days	9 Months

Notes-(I) Tender Closing Date Time of aforesaid tender up to 15.00 Hrs. of **02/07/2026**.

(II) The prospective tenderers are requested to visit the website – www.ireps.gov.in for details of tenders & Corrigendum, if any.

(III) The tender notice is also displayed on **Notice Board** of Sr.DEE(G) Office, Bhusawal.

(IV) Tenderer may participate in above E- tender electronically through website www.ireps.gov.in only & submission of manual offers against e-tender are not allowed & if any manual offers submitted shall neither be opened nor considered.

(V) **Bid Security** :- 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** and shall be valid for a period of 90 days beyond the bid validity period.

Exemptions:

- (i) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as ‘Startups’ shall be exempted from payment of Bid Security detailed above.
- (ii) Labour Cooperative Societies shall submit only 50% of above Bid Security detailed above.

Note:- Subject to exemptions provided above, the tender must be accompanied by a Bid Security as mentioned in tender document, failing which the tender shall be summarily rejected.

(VI) The contractor shall submit self-attested/digitally signed copy of valid Electrical Contractor License as per Clause No. 45 IE Rule 1956 along with the offer. The offer will be summarily rejected in absence of valid Electrical Contractor License.

(VII) Tenderer should submit their credential of work done along with the offer as per ‘Eligibility Criteria’, Definition of “similar nature of work” and Para 7.0 given in tender booklet. (for details please see tender booklet Page. No. 5 to 9)

- (VIII) **Special Condition** - Tenderer, in case of other than Company / Proprietary Firm, Annexure-V(A) shall 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 Annexure-V(A) by the bidder shall result in summarily rejection of his/their bid.** It shall be mandatorily incumbent upon the tenderer to identify state and submit the supporting documents duly self-attested/digitally signed by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.

SENIOR DIVISIONAL ELECTRICAL ENGINEER.
(GENERAL SERVICES)
CENTRAL RAILWAY, BHUSAWAL
On behalf of President of India

PREAMBLE AND SCOPE OF WORK

E-Tender No:- BSL-L-W-T-49-2026

NAME OF WORK :- Electrification work in connection with provision of pathway in Bhusawal, Badnera, Nandgaon, and Khandwa yard.

SCOPE OF WORK :-

The scope of work involves supply, erection, testing and commissioning of switchgears, LED lights/ fittings, earthing, octagonal pole, GI stadium mast, high mast, fencing arrangements, lighting circuit board, LT panel, LT XLPE cables along with their transportation, laying and other necessary accessories etc in Bhusawal Divn:

1.0 APPROXIMATE COST OF THE WORK	:-Rs. 1,42,17,741
TIME AND DATE OF CLOSING	:-15.00 Hrs on 02/07/2026
COMPLETION PERIOD	:- 9 Months
VALIDITY OF OFFER	:-60 days.

2.0 FOREIGN EXCHANGE: No foreign exchange and/or import license shall be released/provided to the Contractor in connection with this contract.

3.0 “Tenderer should participate electronically in E- tender through website www.ireps.gov.in& submission of manual offers against e-tender are not allowed & if any manual offers submitted shall neither be opened nor considered.”

4.0 GENERAL

- i) Water / electricity / transport shall be arranged by the Contractor at his own cost. The Purchaser shall not provide the same under any circumstances. The site for depot / workshop can be provided to the Contractor on his request.
- ii) The Contractor shall arrange at his own cost, all tools & plants, facilities required for erection, testing and commissioning of all the equipment in compliance with the respective specifications.
- iii) The schedule of rates and quantities enclosed should be read in conjunction with the explanatory notes given in the tender papers.
- iv) **Tenderer should submit their credential of work done as per Eligibility criteria of Tender and Similar Nature of Work**

5.0 Bid Security: 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** and shall be valid for a period of 90 days beyond the bid validity period.

Exemptions :-

- (i) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as ‘Startups’ shall be exempted from payment of Bid Security detailed above.
- (ii) Labour Cooperative Societies shall submit only 50% of above Bid Security detailed above.

5.1 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.
- ix. Bank guarantee shall be in the name of “Senior Divisional Finance Manager, Central Railway Bhusawal” on minimum Rs. 500 stamp only.
- x. Successful tenderer will deposit Rs. 200 legal vetting charges before execution of work.

Note :- (a) Subject to exemptions provided under para 5.0 above, the tender must be accompanied by a Bid Security as mentioned in tender document, 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 90days) 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 _____ Railway. Should the tenderer fail to observe or comply with the foregoing stipulation, the amount deposited or Bank guarantee bond submitted as Bid Security for the due performance of the above stipulation, shall be forfeited to the Railway.

6.0 Eligibility Criteria (Refer clause 10 of Part-I of GCC April-2022):

6.1 Technical Eligibility Criteria:

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.

6.2 DEFINITION OF SIMILAR NATURE OF WORK: -

Definition of Similar Nature of Works
Electrification / Rewiring of Service or Residential building / Yard / HT / LT substation work / HT / LT cable work / street lighting / platform or building lighting management / circulating area Lighting / Electrical overhead power supply work / Electrical pump work etc.

Note: (1) Work experience certificate from private individual shall not be considered. However, in addition to work experience certificates issued by any Govt. Organization, work experience certificate issued by Public listed company having average annual turnover of Rs 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to 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.

Note: (2) If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to subcontractor by a Govt. Organization or public listed company as defined in Note 1 above, the same shall be considered for the purpose of fulfillment of credentials.

6.3 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**, along with copies of Audited Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

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

6.5 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.

7.0 Tenderer Credentials:

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

Tenderer(s) 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) Tenderer, in case of other than Company / Proprietary Firm, Annexure-V(A) shall 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 Annexure-V(A) by the bidder shall result in summarily rejection of his/their bid.** It shall be mandatorily incumbent upon the tenderer to identify state and submit the supporting documents duly self-attested/digitally signed by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.
- (v) 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.
- (vi) (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 Bid Security and may also lead to any other action provided in the contract including banning of business for a period of upto two year.**
 (b) **In case of any information submitted by tenderer is found to be false, forged or incorrect after the award of contract, it will lead to termination of the contract, along with forfeiture of Bid Security/Security Deposit and Performance guarantee and may also lead to any other action provided in the contract including banning of business for a period of upto two year.**

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

8.0 - Contractor shall ensure all precautions during digging work close to Rly signaling, telecom electrical cables etc. Penalties to be imposed for damages to any cable as per Railway board letter no. 2021/Tele/5(2)/3-Part(1)/(3425647) dtd 12.06.2023

9.0 GENERAL CONDITION OF CONTRACT:

Unless otherwise stated in the tender papers, contract shall be governed by “**Indian Railways Standard General Conditions of Contract, April 2022**”, along with the amendments, if any, issued by the Government of India, Ministry of Railways (Railway Board) from time to time. In case of any contradiction with the regulations laid down here under, GCC April 2022 with latest orders, modification and amendments will prevail, copy of which may be downloaded from the website:

https://indianrailways.gov.in/railwayboard/uploads/directorate/civil_engg/pdf/2022/GCC_April-2022_2022_CE-I_CT_GCC-2022_POLICY_27_04_22.pdf
and https://indianrailways.gov.in/railwayboard/view_section.jsp?id=0,1,304,366,526

For block working in Bhusawal Division, rules/procedure stipulated in PDSR (Power Distribution & Subsidiary Rules) and G&SR (General & Subsidiary Rules) as applicable for Bhusawal Division shall be followed. Successful tenderer shall ensure himself & his staff for getting acquaintance of these rules. The complete tender document should be read in conjunction with GCC April 2022 and all forthcoming amendments.

10.0 ADDRESSES:

Relevant addresses for specified purposes in connection with the tender are given below:

10.1 For Contract execution –

**Senior Divisional Electrical Engineer,
(General Service) Bhusawal,
DRM office Bldg., 1st floor,
Central Railway, Bhusawal-425201.**

CHAPTER-I

INSTRUCTIONS TO TENDERERS

&

SPECIAL CONDITIONS OF CONTRACT

CHAPTER-I

INSTRUCTIONS TO TENDERERS & SPECIAL CONDITIONS OF CONTRACT

The special conditions of contract shall supplement and to be read together with the General Conditions of Contract, April 2022 of the Indian Railway and the extant orders along with the amendments, if any, issued by the Government of India, Ministry of Railways (Railway Board) from time to time.

1.0 Care in submission of Tenders: -

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.

2.0. 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. **In case a tenderer is participating as Sole Proprietor in a tender, it is mandatory for him to submit an undertaking on suitable stamp paper to this effect clearly mentioning PAN number also along with tender document at the time of submission of tender.**

(ii) Following documents shall be submitted by the tenderer:

(a) Sole Proprietorship Firm:

(i) All documents in terms of Para 10 of the Tender Form (Second Sheet) of GCC April 2022

(b) HUF:

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

(ii) All other documents in terms of Para 10 of the Tender Form (Second Sheet) of GCC April 2021

(c) Partnership Firm:

(i) All documents as mentioned in para 18 of the Tender Form (Second Sheet) of GCC April 2022

(d) **Joint Venture (JV):** All documents as mentioned in para 17 of the Tender Form (Second Sheet) of GCC April 2022

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

2.1 Note :- The tenderer whether sole proprietor / a company or a partnership firm / joint venture (JV) / registered society / registered trust / HUF / LLP etc if they want to act through agent or individual partner(s), should submit along with the tender, a copy of power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person, specifically authorizing him/them to sign the

tender, submit the tender and further to deal with the Tender/ Contract up to the stage of signing the agreement except in case where such specific person is authorized for above purposes through a provision made in the partnership deed / Memorandum of Understanding / Article of Association /Board resolution, failing which tender shall be summarily rejected.

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

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

3.0. 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 3.0. a), b), c) above has not been furnished, contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of contract.

4.0. Participation of Partnership Firms in works tenders:

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

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

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

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

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

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

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

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

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

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

(a) Joint and several liabilities:

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

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

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

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

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

4.10 The tenderer shall clearly specify that the tender is submitted on behalf of a partnership firm. The following documents shall be submitted by the partnership firm, with the tender:

- (i) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar.
- (ii) A notarized or registered copy of Power of Attorney in favour of the individual to tender for the work, sign the agreement etc. and create liability against the firm.
- (iii) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of the Standard General Conditions of Contract.
- (iv) All other documents in terms of explanatory notes in clause 10 (i.e. Eligibility Criteria) of GCC, April-2022.

4.11 Evaluation of eligibility of a partnership firm:

- (i) Technical and financial eligibility of the firm shall be adjudged based on satisfactory fulfillment of the eligibility criteria laid down in Clause 10 (i.e. Eligibility Criteria) of GCC, April-2022.

5.0 TENDERER SPECIAL CONDITIONS:

The tenderer should normally not stipulate any special conditions while submitting his tender. In such an eventuality, Central Railway reserves the right to summarily reject such tenders without assigning any reasons whatsoever. The tenderer should normally submit his tender in full conformity with the tender conditions of Central Railway, Bhusawal. If any particulars are furnished by the tenderer in response to specific tender conditions, by which such particulars are required to be furnished at the tender stage, this shall not be treated as special conditions for the purpose of this para.

6.0 PRICE VARIATION CLAUSE (PVC) : As per GCC along with latest amendments.

7.0 DEFECTIVE EQUIPMENTS TO BE CHANGED :

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

8.0 FINAL ACCEPTANCE:

The final acceptance of the entire equipment installed on the site shall take effect from the date of expiry of the period of guarantee. After expiry of the period of guarantee for each section, a certificate of final acceptance shall be issued by the Purchaser and the last of such certificate will be called the last and final acceptance certificate. The contract shall not be considered as completed until the issue of final acceptance certificate by the Purchaser. The Purchaser shall not be liable to the Contractor for any matter arising out of or in connection with the contract or execution of the work unless the Contractor shall have made a claim in writing in respect thereof before the issue of final acceptance certificate under this clause. Notwithstanding the issue of final acceptance certificate, the Contractor and the Purchaser (subject to sub-clause as above) shall remain liable for fulfillment of any obligation incurred under the provision of the contract prior to the issue of final acceptance certificate which

remains unperformed at the time such certificate is issued and for determining the nature and extent of such obligation the contract shall be deemed to remain in force between the parties hereto.

9.0 ISSUE OF IDENTITY CARDS TO CONTRACTOR'S LABOURS:

Following certificates/documents should be issued to each contract labourers nominated to work in the railway premises by the contractor, indicating Contract No, Name of the person, place of work etc.

1. Identity Card,
2. Character certificate issued by Police Department,
3. Certificate for technical competency.

If these are not issued to contract Labour, he / they will not be permitted to work in the Railway premises. The list of the labour should be submitted to this office for records.

10.0 ISSUE OF MATERIALS TO THE CONTRACTOR:

Contractors have to submit a Bank Guarantee for an amount equal to the cost of material paid to them and to be handed over to them for erection. The cost of material paid to them and handed over to them and under their possession at any time shall not exceed the value of the B.G. already submitted.

11.0 STANDING INDEMNITY BOND:

Cost of all the materials for which 'On Account' payments have been made to the contractor against the Contract and materials handed over to the contractor by the purchaser for the purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to the purchaser shall be covered by the standing indemnity bond(see FormNo.16).

12.0 INSPECTION :

All the material, required for this work shall be subject to inspection to ensure that the work is done in accordance with specification, drawings and is of the best quality suitable for the purpose. Following inspection schedule shall be followed.

- a) **Inspection of material :-**
- i) **At Firm's premises:-** Material having value above Rs.5 lakhs shall be inspected by RITES. Inspection of other materials shall be done by Railway's representative. Firm will submit manufactures original test certificate.
- ii) **After Receipt of material:-** Inspection of other item shall be done at depot / site by Railway Engineer's representative. Contractor shall produce all the test reports, material documents, etc. during inspection.
- iii) All the defects / discrepancies, if any, pointed out during inspection should be attended by the contractor immediately.
- b) **Stage Inspections:-** Stage inspections shall be carried out by Railway Engineer's representative from time to time during execution of the work at site. All the shortcomings noticed during stage inspection shall be attended by the contractor.
- c) **Final Inspections:-** After completion of work, contractor shall offer it for final inspection and testing. All the shortcomings noticed during final inspection shall be attended by the contractor, immediately and a joint inspection shall be carried out by Railway Engineer's Representative and by Contractor Representative after completion of the entire work and a joint inspection report shall be made. The joint inspection report shall be signed by the contractors representative, Railway's authorized Engineer for that work and shall be enclosed

along with the final bill with details of works carried out in individual location. Any defect / shortcomings noticed shall be attended by the contractor immediately.

13.0 MATERIALS/EQUIPMENTS:

All materials used in the work shall be of the best quality and of the class most suited for the purpose specified. All the standard fittings, equipments, motor, gear box, breaks, governors, control panel, cables and other accessories required for this work shall be as per RDSO / RCF / ICF approved make conforming to relevant IS specifications against each schedule item. If any material does not appear in the RDSO / RCF / ICF approved list then make of material should approved by Sr.DEE(G) Bhusawal /Railway representative before supply.

All the equipments, materials, fittings and components will be subject to quality control program of being part of the quality assurance program of the contractor. All the major equipments / material shall be inspected as per inspection clause para 12.0.

14.0 WARRANTY/GUARANTEE :-

After successful completion of entire work and the same has been taken over by Railway, it shall be guaranteed for 12 months. During this period if any defects arise the same shall be made good by the contractor free of cost. LED fittings shall be guaranteed for 5 years.

15.0 RELEASED MATERIAL:-

The released materials should be returned by the contractor to Railways and acknowledged. The released materials should be transported to respective depot with the tenderers men and vehicle as per instruction of Railway's Engineer.

16.0 ELECTRICAL CONTRACTORS LICENSE:

The contractor shall submit self-attested copy of valid Electrical Contractor License as per Clause No. 45 IE Rule 1956 along with the offer. The offer will be summarily rejected in absence of valid Electrical Contractor License.

17.0 OTHER SPECIAL CONDITIONS: -

- 17.1 Tenderers should submit their offer with credentials regarding working capacity and financial capabilities.
- 17.2 Tenderers should submit 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.
- 17.3 Contractors found using un-approved materials shall be, on the spot, stopped from executing further work and suitable action taken to terminate the contract. Particular note of this should be taken and it shall be strictly ensured that only quality work is done.
- 17.4 All completed work shall be jointly recorded by contractors with Railways in 'Measurement Books' which will be available with Rly's engineer No work, other than those recorded in M.B, will be recognized.
- 17.5 Bills shall be submitted in Rly's bill form only. All released materials shall be handed over to Railways at the depot of Senior Section Engineer (EM)'s. Contractors should keep a proper account of the released materials handed over, with proper acknowledgement from Railway's engineer and submit the same along with the bills.(NA)
- 17.6 During the process of work the contractor shall arrange to keep electric supply available to avoid any inconvenience to the occupant and the temporary wiring shall be safe and shall not pose any hazard to any points. It shall be contractor's responsibility to ensure the safety of his man and also materials and occupants from any hazard of electricity during the process of wiring. (NA)
- 17.7 During the process of work the contractors shall arrange to keep the material away from the LC gate to avoid any inconvenience of the traffic on gate.

- 17.8 The switchboard shall be of seasoned teak wood/ PVC confirming IS.
- 17.9 Code of practice for electrical wiring installation shall be followed as per IS-732 – 1989 with latest amendment.
- 17.10 PVC insulated wires for working voltages up to and including 1100 Volt shall be as per IS-694 – 1990 with latest amendment.
- 17.11 PVC insulated (heavy duty)/XLPE electric cables for working voltages up to and including 1100 Volt shall be as per IS-1554 – (Part – I) – 1988 with latest amendment.

18.0 OTHER SPECIAL CONDITION OF THE WORK

The Contractor shall maintain a register showing names and addresses of the person so engaged along with photographs of each person and shall produce the same for inspection on demand by Welfare Officer or such other person so authorized by the owner. The Contractor shall not use or allow to be authorized to be used train or any part thereof for dwelling purpose and shall not allow any outsiders to loiter in or around the train without valid authority.

- 18.1 The contractor shall be required to employ/engage only that number of employees/workers as may be specifically authorized by Railway Administration from time to time and shall maintain complete records of such employees/workers with regard to their names, address qualifications, experience and other required details. The Railway shall have absolute right to test, interview or otherwise assess or determine skills, knowledge, proficiency, capability, etc. so as to ensure that such employees/workers are competent, qualified or otherwise suitable for efficient working. Workers rejected on this account by the Railways shall not be employed/ engaged by the contractor on the work covered by this contract.
- 18.2 The contractor is liable to pay provident fund contribution. Leave salary, medical benefits to his employees and to observe statutory working hours. The contractor is responsible for the proper maintenance of registers, records and accounts so far as compliance with any statutory provisions/obligations is concerned. The contractor to keep proper records pertaining to payment of wages, etc. and also for depositing the provident fund contributions with the authorities concerned. The contractor is liable to defend, indemnify and hold harmless to the Railway from any liability or penalty which may be imposed by the Central, State or local authorities by reason of any violation by the contractor or such laws regulations and also from all claims, suits or proceedings that may be brought against the management arising under or incidental to or by reason of the work provided/assigned under the contract brought by the employees of the contractor, third party or by the Central or State Government authorities.
- 18.3 The contractor will make aware his employees that the contract employee are employee of contractor and the employee are not entitled for any regularization in Railway Service. If such situation arises in future contractor is liable to defend indemnify & hold harmless to the Railway Administration from any such liability.
- 18.4 The contractor shall follow all labour Law, rules, regulation pertaining to labour, whether mentioned or not.
- 18.5 (i)** Contractor is to abide by the provisions of Payment of Wages act & Minimum Wages act in terms of clause 54 and 55 of Indian Railways General Condition of Contract. In order to ensure the same, an application has been developed and hosted on website ‘www.shramikkalyan.indianrailways.gov.in’. Contractor shall register his firm/company etc. and upload requisite details of labour and their payment in this portal. These details shall be available in public domain. The Registration/ updation of Portal shall be done as under:

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

18.6 The payment to the contract labours should be made through Bank / EFT only.

19.0 The registration of contractors working under Railway departments with ESIC is mandatory.

20.0 Special Condition for employment of staff by the contractor for works contract as per HQ's Policy L.no. L.253.AC.AMC/Policy Dated-15.01.2010

Employment of staff-

- (a) The contract is liable for cancellation if either the contractor himself or any of his employee is found to be a person of Gazetted rank of Engineering Department which includes Civil, Mechanical, Signal & Telecommunication Department of Railways whether pensionable or non-pensionable who after retirement has sought engagement as contractor for or in connection with the execution of public works whether on Railway, P.W.D. or Defence Forces or as an employee of such contractor within 2 years of his retirement without obtaining the permission of the President of India before taking up such engagement or employment.
- (b) The contractor shall employ the following technical staff during the execution of the work.
 - i) At least one Graduate Electrical/ Electronics Engineer when the cost of the work to be executed is Rs. 50 lakhs and above.
 - ii) At least one qualified Electrical /Electronics diploma holder when the cost of the work to be executed is more than Rs. 10 lakhs, but less than Rs. 50 Lakhs.
- (c) Technical staff should be available at site whenever required by the Engineer –in-charge to take instructions. In case the desired level of technical staff fails to take instructions of the Engineer –in-charge, contractor shall liable to pay a reasonable amount to the Railways not exceeding a sum of Rs. 5000/- (Rupees five thousand only) for each calendar month or part

thereof for default in case of Graduate Engineer and Rs. 2500/- (Rupees two thousand five hundred only) for each calendar month or part thereof for default in case of Diploma holder.

- (d) The decision of the Engineer-in-charge as to the period for which required technical staff was not employed by the contractor and as to the reasonableness of the amount to be deducted from the contractor, shall be final & binding on the contractor.
- (e) The contract is liable to be terminated in case of persistent failure to engage suitable technical staff by the contractor.

CHAPTER – II

PRICES AND PAYMENT

CHAPTER – II

PRICES AND PAYMENT

1. SCOPE :-

This chapter deals with prices to be paid for the various items of work and other amount payable in accordance with accepted schedule of prices and conditions of payment herein mentioned.

2. SCHEDULE OF PRICES :-

The unit rates given against various items of work in tender papers are the schedule of rates. The tenderers are required to quote **rates above /at par/ below as specified** against schedule of rates while quoting the summary of prices. The actual payment to be made against any item of Schedule of rates shall be derived after loading the Schedule of rates prices with the tenderer's quoted percentage. The prices so obtained shall be the unit prices for the various items of work given in Schedule of rates.

3. INCIDENTAL CHARGES :-

The unit prices are including of loss, wastage, incidental charges for transportation, loading, unloading and handling of materials. It also include commissioning for arranging dispatch by rail, completing all necessary formalities in this respect, arranging payment of wages collection of railway receipt all insurance premier banker's charges etc.

4. OTHER PRICE PAYMENT :-

No adjustment in unit price on account of price fluctuation will be permitted on any account.

5. PAYMENT TERMS :-

(i) On A/c. payment for supply

(a) Payment to the extent of **70 %** towards cost of supply of materials will be made on receipt of the materials only either at site or at purchasers depot of the following tender schedule items as tabulated below :

Sch.	2, 3, 5, 7 to 10, 17, 25 to 27, 34, 35, 37 to 39, 42
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Received material shall be duly supported by Suppliers delivery challan and inspection certificates of Engineers representative. Engineers representative shall make proper accountal of material received.

(b) The following schedule items whose supply & erection rates are combined, payment to the extent of **60%** towards cost of supply of material shall be made subject to conditions as mentioned above:

Sch.	1, 36
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Further balance payment will be released after erection & satisfactory completion of each item and quantity as certified and measurements recorded in measurement book by engineer's representative.

(c) Firm will submit manufacturers original test certificate and material purchase proof from OEM or his authorized agents.

(ii) Issue of materials to the contractor for erection.

The material for which payment has been released will be issued by Railway to the contractor for execution of work as per site requirement and as per the discretion of 'Engineer'

(iii) Progress on account payment for Supply & erection

The contractor shall be paid payment to the extent of **30%** of supply & 100% of erection for such item as given above in **i)(a)** on satisfactory completion of each item and quantity as certified and measurements recorded in measurement book by engineer's representative.

(iv) 100% progressive payment for following schedule items of tender schedule shall be made after successful completion of same :

Sch.	4, 6, 11 to 16, 18 to 24, 28 to 33, 40, 41, 43
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(v) Final payment: - Final Bill of supply & erection shall be paid after successful completion of entire work as per terms, condition and scope of work of contract and provisional acceptance of the work.

(vi) Joint inspection report with engineer's representative and provisional acceptance certificate by engineer shall be submitted by contractor.

The payment shall be made against

- i) Certificate by the Railway representative that the work has been done in accordance with the provision of the contract agreement and all the material replaced by the contractor during the maintenance period has been of good quality and as per specification.
- ii) All the schedule as mentioned in the tender has been successfully carried out.
- iii) The statement of recovery if any.
- iv) Valid security deposit furnished in advance at the time of signing of agreement. All the above payments shall be subject to observance of all formalities viz. Signing of agreement, furnishing S.D., verification of power of attorney, MB formalities, bill in Railways standard form etc.

Note: Following particulars to be furnished by firm

i) PAN NO. ii) FULL ADDRESS iii) GST REGISTRATION

6. FINAL PAYMENT :-

On completion of entire work in all respect and on submission of joint inspection report and PROVISIONAL ACCEPTANCE CERTIFICATE, the contractor shall receive the final payment for remaining works.

7. REFUND OF SECURITY DEPOSIT:-

The security deposit will be refunded on submission of Final Completion Certificate after successful completion of the contract and after expiry of the guarantee obligation.

8. TAXES :-

The contractor should have GST registration number.

(i) 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.

(ii) 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.

(iii) 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. **(Authority –Railway Board's Letter No.2017/CE-I/CT/4/GST Dated 23/06/2017.)**

9. PENALTY :-

- 1) As per relevant clause of GCC April 2022.
- 2) A suitable token penalty shall be imposed if any deficiency in workmanship or quality of work is noticed during inspection by competent authority.

CHAPTER-III

TECHNICAL SPECIFICATION

Central Railway

Electrical (G) Branch Bhusawal Division

E-Tender no.BSL-L-W-T-49-2026

This tender calls for the work of Electrification work in connection with provision of pathway in Bhusawal, Badnera, Nandgaon, and Khandwa yard.

1.Schedule item no. 33

Supply, installation, testing & commissioning of single phase RCBO of 32A capacity, 30mA sensitivity with metal enclosure.

The price shall cover the cost of work includes supply, installation, testing & commissioning of single phase RCBO of 32A capacity, 30mA sensitivity with metal enclosure of suitable size as per site requirement.

Compact single phase RCBO of 32Amp, sensitivity 30mA with overload, short circuit and earth leakage protection. The RCBO shall be of make as per list enclosed. ISI marked and as per IS 12640 (Part 2) IEC 61009 – 1.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

2. Schedule item no. 22

Supply & erection of 3 core x 2.5 Sqmm armoured copper Cable.

The price shall cover cost of supply, loading, transportation and unloading to site, laying, testing and commissioning of LT cable 1.1 KV grade, XLPE insulated, PVC sheathed, armoured Copper cables of above size, conforming to IS-7098/I/1988 (or latest). Price shall also include supply and erection of lugs, clamps, saddles etc. for laying and raising of the cable. Cable shall be laid underground in cable trench, under and across Railway track, along wall / RCC structures etc. as per site requirement. Wherever cables are running parallel both cables shall be laid in the same trench only through separate trunking in such a way that the cable shall not cross each other

throughout the length of the trench. Cable identification tags shall be provided throughout the length at every 25 meters interval. The cable shall be procured from reputed make.

3.Schedule item no. 7 to 14, 18

Supply of 4 core 16 sqmm armoured XLPE Cable.

Supply,of 4 core 25 sqmm armoured XLPE Cable.

Supply of LT XLPE Armoured 4 Core 50 Sq mm Aluminium cable as per relevant IS.

Supply of 4 Core 70 Sqmm armoured LT XLPE Cable.

Trenching & refilling of LT/HT/ Various sizes of PVC / XLPE cables- Along the Road (Size - 900mm x 300mm)

Digging of cable trench 300/450 mm x 1000 mm in RCC/PCC/hard soil & refilling as per specification and requirement at the site.

Transportation, Laying, Installation, terminating, testing and commissioning of LT/HT cable of sizes 10 sqmm to 300 sqmm in existing trench, pipe or on structure.

Erection, testing and commissioning of cables other than trench i.e.Wall/Truss including clamp, GI wire and hardware

Supply and laying of RCC Hume Pipe of size 6"(150mm) dia 2 mtr. Length.

LT XLPE Copper Cable

Cable shall be cross linked polyethylene and XLPE insulated PVC outer sheathed cable with copper conductor suitable for rated voltage at 1100 V grade and confirming to IS : 7098 Part -1 1988 with amendment number 1, 2 & 3 Reaffirmed 2005 or latest.

Armouring – Galvanised steel strip armoured

Shape of conductor -stranded

No. of core – 4 core / 2 core (as per schedule item description)

BIS marked,

Material of conductor – Copper EC grade.

Cable to be supplied on wooden drums confirming to IS : 10418/82 with latest amendments.

In addition to marking requirement as per relevant specification, sequential marking for length, size of the cable, type of the cable & drum No., shall be embossed /printed on the cable.

LT XLPE Aluminium Cable –

Cable shall be cross linked polyethylene (XLPE) insulated PVC outer sheathed cable with alluminium conductor suitable for rated voltage at 1100 V grade and confirming to IS : 7098 Part -1 1988 with amendment number 1, 2 & 3 Reaffirmed 2005 or latest.

Armouring – Galvanised steel strip armoured

Shape of conductor -stranded

No. of core – 4 core / 2 core (as per schedule item description)

BIS marked,

Material of conductor – Aluminium EC grade.

Cable to be supplied on wooden drums confirming to IS : 10418/82 with latest amendments.

In addition to marking requirement as per relevant specification, sequential marking for length, size of the cable, type of the cable & drum No., shall be embossed/printed on of the cable.

1. SPECIFICATION OF CABLES

1.1 L.T CABLE

Cross linked polyethylene insulated PVC sheathed conductor cable with common covering over cores, provided other by extended inner sheath of thermo plastic vulcanized or invulcanized rubber galvanized single trip armoring suitable for 1100 volts grade conforming to IS 157098 (Pt-I) of 1988 with latest amendments size of cable should be as per requirement shown in plan & scope of work.

1.2 ARMORING

Armoring of cable should be conform to ISS: 3975/79

1.3 INSULATION

The insulation of cable should conform to IS 7098 - Pt. -I –1988 table I.

1.4 ALUMINUM CONDUCTOR

The Aluminum conductor should comply with 8130-1984

1.5 CABLE

It should be ISI marked and should be of the make specified in attached approved list of Materials

LAYING OF LT / HT CABLE -

(A) The cable laying shall conform to IS 1255/1983 or latest. The cable shall be laid by digging a trench in the ground and laying cables on a bedding of minimum 75mm riddled soil or fine sand at the bottom of the trench and covering it with additional riddled soil or sand of minimum 75 mm. The width of the trench should be at-least 300mm(12") and make the surface as original/earlier.

(B) Cable should be covered with best quality of tiles, bricks or slabs continuously on entire length of cable. Layer of bricks/ tiles / slabs shall be ensured to protect the cable from damages. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm (6") above the ground level.(FOR LT CABLE)

(C) The cable shall be covered with RCC Warning Cover of size 450mm X175mmX 37mm (18"X7"X1.5") completely. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm(6") above the ground level.(FOR HT CABLE)

(D) Cable marker should be provided at a spacing of 50 Mtrs. On straight runs one marker at 50 Mtr shall be provided and ends of track or road crossing or as per instructions of railways engineer at every turning of cable. (FOR HT CABLE)

(E) While terminating the cable on the wall, it shall be fixed with the help of "J" hooks and secured properly on walls. Size of hook shall depend on size and weight of the cable.

(F) Where cable has to be taken on pole the suitable size of clamp, nut Bolt shall be used. The cable shall go through GI pipe of suitable size.

(G) The laying of RCC pipe /GI pipe /PVC pipe is also the part of cable laying cost under track /Road/ on pole. However supply of RCC pipe /GI pipe/PVC pipe shall be covered separately in schedule or supplied by Rly. at SSE's depot.

(H) Wherever cables are to be taken through pipe on existing steel structures / walls, the pipe shall be supported on steel structures with suitable and proper clamps made from 50 X 6 mm thick GI flat, fixed to the structures with, 16 mm dia GI bolt, nut and plain, spring washer.

(I) **MINIMUM PERMISSIBLE BENDING RADII** –The cable should not be bent to sharp radius. Wherever possible larger radii should be used. Minimum recommended Bending Radii are given as follows-

VOLTAGE RATING	PVC & XLPE CABLE	
KV	Single core	Multi core
Upto 1.1	15 D	12 D
Above 1.1 to 11	15 D	15 D
Above 11	20 D	15 D

Note D' is outer diameter of cable. Special precaution should be taken so as not to damage the cable. At joints and terminations bending radius for the individual cores should be above 12 times the diameter over the insulation.

(J) **DEPTH :-** The desired minimum depth of laying from ground surface to the top of cables is as follows-

i) Cable up to 11 KV rating =0.9 mtr

ii) 22 KV to 33 KV rating =1.05 mtr

iii) Cables at road crossing =1.00 mtr

iv) Cables at railway level crossing (measured

From bottom of sleepers to the top of pipe) =1.00 mtr

Supply and laying of RCC Hume Pipe of size 6"(150mm) dia of 2 mtr. Length for each pipe of standard thickness as per IS 451 Type – NP-2 in provided depth below ground /Road/Track to enclose the cable and necessary back filling.

Note : LT XLPE cable to be terminated by suitable termination kit of reputed make.

TESTING OF CABLE-

i. After laying the XLPE cable and making the cable end termination, it shall be tested by the contractor with high pressure testing equipment as per relevant IS specification in the presence of Railway representative. High pressure testing set shall be arranged by the contractor at site.

ii. Insulation resistance reading of the cable shall be taken before the contractor is allowed to lay the cable or allowed to carry out cable end termination work.

iii. Insulation resistance (IR) values of cable shall be taken in the presence of Railway representative before and after the high pressure testing. Tenderer shall ensure the IR value does not reduce appreciably after carrying out the cable laying, making cable end termination and high pressure testing

iv. The test results jointly be signed by the contractor and SrDEE(G)'s authorized representative.

Laying erection, testing and commissioning of LT 1100V grade PVC armoured aluminium conductor cable of various size as per specification.

Laying/Erection, testing and commissioning of XLPE armored cable with continuous GI Earth wire, Glands/lugs etc. on wall /trusses/pole/pipe etc as per the instruction of field engineer.

Clearances

The desired minimum clearances are as follows -

Power cable to control cable - 200 mm Power

cable to communication cable - 300 mm Power

cable to gas / water main - 300 mm

Power to power cable - Clearance not necessary: however, larger the clearance, better would be current carrying capacity.

CABLE LAYING (HT & LT) SHOWN

SEPARATE Date of test

Voltage of megger used

Location from

to Size in sq

mm Total

length

Megger value at the time of issue

Megger value during laying & before covering

Signature of contractor

High voltage testing before commissioning HT/LT cable and overhead lines work

Cable works

i) Wherever high voltage test was conduct ----- Yes / No

ii) If conducted, system of supply -----

Test H/V applied -----KV for ----- minutes.

Result of test ----- (Satisfactory / Unsatisfactory)

iii) If not conducted

Voltage of megger used -- - - - -

Result of megger used -----

Result of megger testing -----

Between R & Y
Y & B
B & R

-do- R & N
Y & N
B & N

-do- R & E
Y & E
B & E
N & E

Signature of contractor's

Cable jointing No of joint Location

Type of jointing

Size of cable I

II

Clause Nos

Voltage of megger used I

II

i) Insulation resistance before jointing

Cable I a) Between R & Y

Y & B

B & R

b) -do- R & N

Y & N

B & N

c) -do- R & E

Y & E

N & E

Cable II a) Between R & Y

Y & B

B & R

b) -do- R & N

Y & N

B & N

c) -do- R & E

Y & E

N & E

ii) Insulation resistance of jointed cable

a) Between R & Y

Y & B

B & R

b) -do- R & N

Y & N
B & N
c) -do- R & E
Y & E
N & E

Signature of contractor

IS for Cables

1	IS : 7098 (Part-I)	Cross linked polyethylene insulated PVC sheathed cable for working voltage and including 1100 Volts.
2	IS : 1554 (Part-I)	PVC insulated (heavy duty) electric cables for working voltage upto and including 1100V.
3	IS : 3961 (Part-II)	Recommended current ratings for cables.
4	IS : 3975	Mild steel wires, strips and tapes for armouring of cables
5	IS : 4905	Methods for random sampling
6	IS : 5831	PVC insulation and sheath of electrical cables.
7	IS : 8130	Conductors for insulated electrical cables and flexible cords
8	IS : 10418	Specification for drums for electric cables.
9	IS : 10810	Method of tests for cables.
10	ASTM-D-2843	Standard test method for density of smoke from the burning or decomposition of plastics.
11	ASTM-D-2863	Standard method for measuring the minimum oxygen concentration to support E3 candle like construction plastics.
12	IEC-754 (Part-I)	Test on gases evolved during combustion of electric cables.
13	SS:424-1475	Flammability testing of cables.

Technical parameters-

1	Power system details	415 V +/-10%, 3 phase, 4 wire solidly earthed.
2	Frequency	50 Hz.
3	Size of cable, conductor & quantity	As per S.O.Q.
4	Core identification	Colour scheme as per IS 1554 (part I) /88 or latest
5	Conductor	Stranded circular/sector shape core Aluminium/Copper conductor
6	Rated voltage	1100 Volts
7	Insulation	XLPE
8	Maximum conductor temperature at rated	90°C

	current.	
9	Maximum conductor temperature during short circuit under hot condition	250°C
10	Inner sheath	Extruded PVC inner sheath
11	Filler material	If used, shall be compatible with other materials of cable construction
12	Armouring	Single layer galvanized steel round wire/ flat strip armoured.
13	Overall serving (outer sheath)	Anti rodent and anti termite extruded black FRLS grade PVC sheath (Type ST-2)
14	Embossing on the cable	Cable shall be embossed / printed on the outer sheath at every 1 m. length as under :1.1 kV, PVCA/XLPE, conductor material, No. of core and size of cable, sequential marking for the metered length of cable, make and year of manufacturing

4.Schedule item no. 15

Supply & laying of GI pipe Class B, ISI marked under road /Clamping with erecting pole or wall as per technical specification & drawing for passing cable.

Supply & laying of GI pipe Class B, ISI marked under road /Clamping with erecting pole or wall as per technical specification & drawing for passing cable of dia 50-63mm.

This item shall be in conformity to IS 5613/Pt.I Sec. 1 & 2/1985 (Latest Version). GI pipe shall conform to IS 1239/Pt.I/1990 and fittings shall conform to IS 1239/Pt.II/1992(Latest Version).

5.Schedule item no. 16

Supply, installation, testing & commissioning of HDPE Pipe 110 mm Nominal Dia as per IS-4984-1995.

Supply, installation, testing & commissioning of HDPE Pipe 110 mm nominal dia & laying of HDPE (High Density Poly Ethylene polymers) pipe of Material Grade- PE 63 grade, IS 4984 Resistance to chemicals- Exceptional resistance to all external and internal corrosion. Resistant to electrolytic corrosion.

Indian Standards - IS-4984, IS 14151, IS 14333, IS 14930 (part2), IS 14885, IS 16098 (part2).

6.Schedule item no. 17

Supply and laying of RCC half round pipe 150 mm ID & 1 mtr length.

The contractor shall supply half Round RCC pipe of 150mm inner dia. and 1 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.

Internal dia.	External dia.	Thickness	Approx. Weight	Approx. Steel Weight
150mm	184 mm	25 mm	14.5 kg	240 gm

Laying of Pipe - 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 same on his own cost. The cost of damage will be decided by Railway.

Note - Inspection will be carried out as per inspection clause.

7. Schedule item no. 20

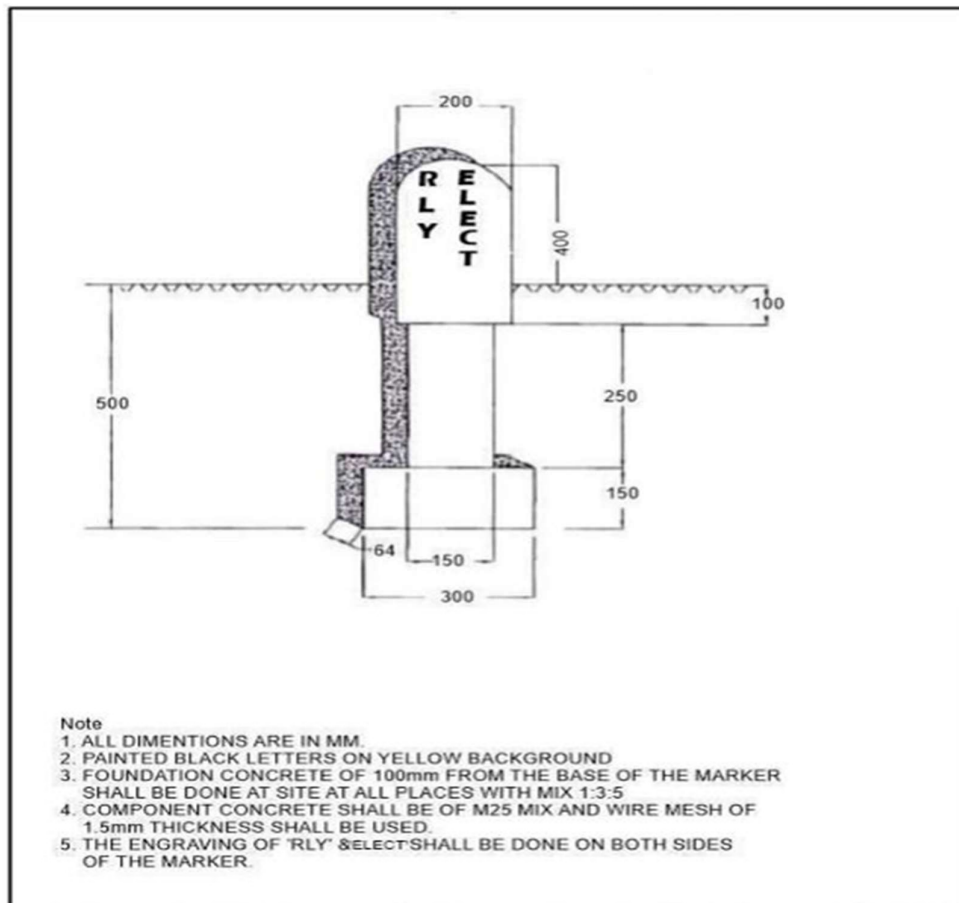
Supply & Erection of RCC Warning Cover and refilling the cable trench in an approved manner.

The price shall cover supply, erection testing commissioning of **RCC Warning Cover and refilling the cable trench** of size 450mm X 175mm X 37mm (18" X 7" X 1.5") completely. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm (6") above the ground level.

8. Schedule item no. 19

Supply, erection of RCC Type Cable route marker with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10cm including inscription duly engraved as required.

The rate includes casting and fixing of cable route marker as per drawing (attached below) at a distance of approx. 50 mtrs or as per site requirement along the trench and at places where the cable route has taken diversion as per instruction of site Engineer. This includes casting of foundation at site and fixing of the marker in the foundation made earlier at site as per railway directives and specifications. This also includes proper curing of the structure. All materials required for this like cement, sand, 15 mm chips and steel rod of ISI marks should be supplied by the tenderer.



9.Schedule item no. 23

Supply, fabrication, fixing and erection of MS work of miscellaneous size and for cable tray etc. including painting complete.

The price shall cover the cost of Work includes fabricating and erecting MS work, riveted, bolted or welded in built up sections including cutting, grinding and straightening, drilling, riveting, handling, hoisting and fixing in position etc. including applying a priming coat of approved steel primer etc. and duly painted with fine finish with contractors steel and materials. The work shall be done as per the site requirement in an approved manner and as per the instructions of field supervisor.

10.Schedule item no. 6

Supply, fabrication, laying welding and connection of GI Flat of size 25x3 mm from earth pit with GI nut Bolt suitable size.

The work for Supply, fabrication, laying welding and connection of GI Flat/ strip of size 25x3 mm from earth pit with GI nut Bolt suitable size from main earth pit to main board/metallic body of installation. The work shall be done in an approved manner as per site conditions as per the instructions of field engineer. GI flat shall conform to IS-2062 & its latest amendments for steel & Galvanization as per IS-4759/1996 and its latest amendments.

11.Schedule item no. 5

Supply, erection, testing & commissioning of maintenance free earth as per RDSO specification no. RDSO/PE/SPEC/ PS/0109-008(REV '0') with improved earthing enhancing compound and exothermic welding as per specifications attached.

The maintenance free earthing arrangement shall be done in accordance with RDSO specification no. RDSO/ PE/ SPEC/ PS/ 0109-2008 (REV'0'). For transformers, substation earthing, LT line equipment (**40 kA**), The IR value shall be less than 1 ohm., in normal soil resistivity upto 50 ohm-mtr, single electrode type earth system.

The earthing system includes earth electrode, installation of earth electrode in suitable pit size, construction of earth pit with cover for the installation, connection of earth electrode with equipotential earth bus and connection of equipment to equipotential earth bus. The work shall be done in an approved manner as per site conditions as per the instructions of field Engineer.

Concentric pipe earth electrode : (Current capacity 40 kA)

Primary conductor -

MS pipe with 40 mm diameter, class B, ISI mark as per IS-1239, length 3000 mm.

Secondary conductor -

MS pipe with 80 mm diameter, class B, ISI mark as per IS-1239, Length 3000 mm.

Current carrying capacity : The design of the electrode should be such as to have current carrying capacity in 40 kA (for 1 second).

S.N.	Current Capacity	Primary Conductor diameter	Electrode dimensions (dia. X length)
1	40 kA	40 mm	80 mm x 3000 mm

Dimensions and Nominal Mass of Steel Tubes — Medium (as per IS 1239)

Nominal Bore	Outside Diameter		Thickness	Mass of Tube
(mm)	Maximum (mm)	Minimum (mm)	(mm)	Plain End (kg/m)
40	48.8	47.9	3.2	3.56
80	89.5	88.0	4.0	8.36

Conductive mixture

- 1) For hermetically filling inside the cavity i.e. between secondary conductor and primary conductor, crystalline compound is to be injected in the electrode assembly. It is a combination of high conductivity metal alloys, copper and aluminium powder, conductive carbon/cement and bonding material etc. mixed in different portion. The mixture is forced (pressurized) filled inside the earth electrode in the paste form and after solidification of the same, the end caps are welded. The metal alloys shall help in conducting the current and conductive carbon gives anti corrosive property. Bonding material should provide strength to the mixture. Resistivity of the mixture shall be less than 0.2 ohm-meter. Resistivity shall be tested by making a 20 cm cube of the material and checking resistance across the opposite face of the cube.
- 2) Complete electrode shall be molecularly bonded by 99.99% pure, high conductivity copper on outer surface with copper coating thickness 300 micron or more.
- 3) Its surface shall be clean and free from any visible oxide layer or foreign material.
- 4) Copper bus bar of size 250 mm x 50 mm x 6 mm having electrical conductivity of 101% IACS, minimum 99.9% copper content shall preferably be exothermically welded to earth electrode or connected with the help of two number stainless steel nut bolts of appropriate size having 4 holes of 12 mm dia. (2 on each side) for connecting earthing conductor.

Minimum quantity of earth enhancement material to be supplies :

For 5'x5'x10' earth pit – min 75 kgs per pit

For 300 mm bore type earth pit – min 50 kgs per pit

The earth enhancement material shall be supplied in sealed, moisture proof bags. These bags shall be marked with manufacturers name or trade name, quantity, batch no & date of manufacture.

Warranty : 05 year against earth electrode for copper plating. If found faded or corrosive whole earthing is to be replaced by tenderer.

Note : *Earthing Pit Box should be supplied & erected by contractor. Also necessary cementing work to be done by contractor to make site as original.*

R.C.C. earth pit box

R.C.C. earth pit box of size 450 X 450 X 50mm including cover of size 450 X 450 X 4.5mm along with white wash. The work shall be done in an approved manner as per the instructions of field supervisor.

PVC Large Earth Pit

PVC Large Earth Pit Cover (10 inches) At Top (Dia) -252 mm At Bottom (Dia) – 334 mm Height – 260 mm (IS-3043).

Special Features -

- A durable round valve box ideal for commercial and residential installation.
- Round Valve box extra support for strong load
- Twist lock design cover

- UV Resistant
- Pipe cutouts for quick and easy installation
- Damper proof

➤ Every individual earth shall be allotted a serial number. Following information shall be suitably written with white or yellow paint.

- Earth No. _____
- Individual earth resistance _____ ohms
- Overall earth resistance _____ ohms
- Date of test _____

Test report of earthing system (To be connected by earth Tester)

i) Individual Earth Resistance

Earth Electrode No 1 _____ ohm

Earth Electrode No 2 _____ ohms

Earth Electrode No 3 _____ ohms

B

ii) Overall Earth Resistance:

a) HT earth electrode _____ ohms

b) LT earth electrode _____ ohms

c) Neutral earth electrode _____ ohms

Note: Before energization of installation earthing system will have to be checked by contractor in presence of Sr. DEE/G/BSL's authorized representative/Site in charge and test report be submitted to Sr. DEE/G/BSL for his approval on above prescribed Performa.

Signature of Tenderer

12.Schedule item no. 24

Supply of all required material, excavation and casting of cement concrete foundation/concreting in ratio 1:3:6 for above work.

Supply of all the required material for concreting, excavation of pit of required size in all type soils. Casting of cement concrete foundation in ratio 1:3:6 in accordance with the standard. The excess soil / material excavated shall be removed to safe place as per the directives of Railway representative. Work includes grouting of pole, casting of muffing to poles transformer plinth and foundation of various panel shall be done in 1:3:6 ratio. The cost of work also include, painting of muffing and plinth with cement paint of black color. The work shall be done under joint supervision of Railways representative.

13.Schedule item no. 36

Supply, fixing, testing & commissioning of LED street light luminaries 48W maximum, whether proof having IP 65/66 protection, having inbuilt auto dimming driver and sensor, System efficacy 100 lm/W, Luminaires must be capable of delivering minimum 4800 lumens, luminaries complete with all accessories.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of LED street light luminaries 48W maximum, whether proof having IP 65/66 protection, having inbuilt auto dimming driver and sensor, System efficacy 100 lm/W, Luminaires must be capable of delivering minimum 4800 lumens, luminaries complete with all accessories.

14.Schedule item no. 38

SETC of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP66 protection, Wattage 70 \pm 2 watts, input voltage-240 volts ac, 50Hz. Complete with PIR sensor based with IR sensor.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of LED street light Road way fittings in Aluminum PDC housing and toughened glass cover with IP66 Protection, wattage- 70 \pm 2 W, input voltage-240 volts AC, 50 Hz complete. IK-07, BIS certified.

Features and benefits :-

Delivers excellent illumination
 Long life and photobiologically safe LEDs
 Instant light with low running temperatures
 Operating voltage – 140 V – 270V
 Operating temperature : -10°C + 50°C
 Autonomous sensor based dusk to dawn SL
 IR sensor to mitigate the effect of surrounding artificial light
 Average life L70B50 : 50000 hours.

Housing and finish :- Pressure die-cast aluminium alloy for housing (heat sink) for effective thermal management sturdiness excellent corrosion resistant.

Light source :- High efficiency long life LED module with SMD LED package mounted on MCPCB. Lumen efficacy of LED >140 lm/W

Optics :- High efficiency polycarbonate UV stabilized cover

Electronic driver :- Powered by integral, isolated electronic LED driver (SMPS based constant current supply with lower THD, output open / short circuit protection, over voltage protection, surge voltage protection 10 KV with SPD & other safety test as per IS 15885 Part-2 /Sec 13)

15.Schedule item no. 2

Supply, erection, testing and commissioning of 16 meters high mast system with accessories mast shall be in two sections, hot deep galvanized and suitable for wind velocity as per IS 875, erection complete with guarding poles.

HIGH MAST LIGHTING -

Work includes Supply, erection, testing and commissioning of 16mtr. high mast lighting structure in 2 sections and hot dip galvanized including head frame, steel wire rope 6 mm dia.(7/19 construction), trailing cables, galvanized lantern carriage suitable for 9 nos. luminaries with 160 watt LED lighting & control gear box, lighting finial, Double drum winch, Power tool, Aviation light, control panel housing contactors, single dial timer, RCBO 4 Pole 16A, MCBs for auto switching ON & OFF on preset time through timer and dusk to dawn controller to switch ON/OFF lights as per sunset / sunrise through photo sensing relay. Work includes casting of suitable foundation with M-25 concrete considering the safe soil bearing at site. All material & accessories shall be from OEM only.

DETAIL SPECIFICATION FOR 16 MTR. HIGH MAST LIGHTING.**1.01 APPLICABLE STANDARDS**

The following shall be the Reference Standards for the High Mast.

Sr.No.	Code No.	Title
1	I.S.875(Part III) 1987	Code and practice for design loads for structures
2	BS EN 10025:2004 /DIN 17100 grade S355 J0	Grades of M.S. Plates
3	BS.5135/AWS	Welding
4	BS ISO 1461	Galvanizing
5	TR.No.7 2000 of ILE,UK	Specification for Mast and foundation
6	IS 2062	Mild Steel
7	IS 3459 / 2266	Stainless steel Wire rope
8	IS 9968 Part – 1	Trailing Cable
9	IS 325	Motor

1.02 **HIGH MAST**

1.02.1 **Structure :-** The High mast shall be of continuously tapered cross section, at least 18 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 part 3 1987. The mast dimension shall be as per enclosed datasheet.

1.02.2 **Construction:-** The mast shall be fabricated from special steel plates, conforming to BS-EN 10-025 or equivalent, cut and folded to form a polygonal section as stated at 1.02.1 above and shall be telescopically jointed and welded. The welding shall be in accordance with BS.5135/AWS. The procedural weld geometry and the workmanship shall be exhaustively tested on the completed welds. Mast shall be delivered to site in sections.

Each section shall be fabricated out of individual plates duly folded and welded. There shall be only one longitudinal seam weld per section. Sections fabricated out of multiple plates or with more than one weld shall not be accepted. There shall not be any other internal or external welds in the mast sections.

At site the section 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. The dimensions of the mast shall be based on proper design. Manufacturer of the mast must have conducted wind Tunnel test on their mast sample. Parameters considered for design shall be taken from the wind Tunnel Test.

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- hole 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 65 micron for the bottom and top sections. The mast sections shall be galvanized by single dipping method for better adhesion and life. Sections galvanized by double /multiple dipping methods shall not be accepted.

1.02.3 **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, cables, plug and socket, etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof 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.

1.02.4 **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(3 Second gust) and shall be measured at a height of 10 mtrs. above ground level. The design life of the mast shall be minimum of 25 years.

1.03 **Lantern Carriage:**

1.03.1 **Fabrication:-** 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 designed and fabricated to hold the required number of flood 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 nylock 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.

1. 03.2 **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 carriage, shall be made.
- 1.04 **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 the mast and the specially designed head frame assembly at the top.
- 1.04.1 **Winch:** - The winch shall be of completely self-sustaining type, without the need for brake shoe, springs or clutches. Each driving spindle of the winch shall be positively locked when not in used, by gravity activated PAWLS. Individual drum also should be operated for fine adjustment of 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 as specified in datasheets. The winch shall self –lubricating type by means of an oil bath and 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 even when the lantern carriage is fully lowered and rested on the rest pad. It should be possible to operate the winch manually by a suitable handle and /or by integral power tool. Operation of the winch manual handle will be independent of the power tool. Winches with manual operation through the power tool shaft shall not be accepted. It shall be possible to remove the double drums after dismantling, through the door opening provided at base of the mast. Also, a winch gear box for simultaneous and reversible operation of the double drum winch shall be provided as part of the contract.

The winch shall be type tested in presence of reputed institution and the test certificates shall be furnished before supply of materials. A test certificate shall be furnished by the contractor from original equipment manufacturer, for each winch in support of maximum load operated by the winch.

- 1.04.2 **Head frame :-** The head frame which is to be designed as a capping unit of the mast, shall be 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 aluminum alloy (LM-6). Pulley made of synthetic materials such as plastic or PVC are not acceptable. Self-lubricating bearing 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 dislodged 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 :- The suspension system shall essentially be without any intermediate 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 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 the beginning of this specification. The end construction of ropes 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/ terminations, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.

1.05 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 connections 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. Size of the cable shall be minimum 5 core 2.5 sqmm copper.

The cable shall be of reputed make. At the top there shall be weather proof junction box to terminate the trailing cable. Connections from the top junction box to terminate to the individual luminaries shall be made by using 3 core 1.5 sqmm flexible PVC cables of reputed make. The system shall have in-built facilities for testing 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 assembly 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. Automatic lighting ON-OFF based on dawn to dusk operation through suitable photo sensing relays and automatic switching ON/OFF at preset time through timer relay.

1.06 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 the 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 of single speed, provided with a motor of the required rating. The power tool shall be supplied complete with a suitable control switch so that the operation of the Mast can be done at a safe distance. 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 be not only 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 problems with the electrically operated tool, shall be provided and shall incorporate a torque limiting device.

There shall be 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 over all safety of the system. Each Mast shall have its own power tool motor.

1.07 Lightning Finial :-One number heavy duty hot dip galvanized lightning finial shall be provided for each mast. The lightning finial shall be minimum 1.2 meter 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 lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.

1.08 Aviation Obstruction Lights :-Suitable Aviation Obstruction 02 Nos Lights of reliable design and reputed manufacturer shall be provided on top of each Mast.

1.09 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 lightning and electrical earthing of the Mast.

1.10 Feeder Pillar :-Each Mast shall be provided with a Feeder pillar fabricated out of 14 SWG CRCA steel 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 32A TPN switch, HRC fuses, double dial timer, suitable size of contactors for lighting and power tool, 2 nos. outgoing, reversing switch for motor. Feeder pillar shall be mounted on suitable foundation near to the Mast.

1.11 Incoming Power Cable :- 4 x 2.5 sqmm. Copper conductor armoured cable for motor supply shall be provided from feeder pillar to the base compartment of the High Mast. Cable shall be taken to the base compartment of the High Mast through the provision made in the foundation. Power cable of suitable size up to the feeder pillar, from supply point, shall be provided by the contractor. All the work for the power supply to the high mast shall be carried out by the contractor. Supply point to high mast will be made available suitably by laying of cable as separate schedule item and as per site requirement

1.12 Luminaires :- Luminaires shall be specially designed with suitable lamp housing and control gears with required LED flood lights Lamps as prescribed in tender schedule. If the control gear box of the luminaire is separated then it shall be out of die cast alluminium alloy. The luminaries shall be tested as per Indian Standard and test reports shall be submitted along with the materials. The luminaries shall be suitable for installation on High Masts.

1.13 FOUNDATION FOR HIGH MAST

Foundation for the high mast should be in accordance with the standard design of high mast manufacturer. Detailed foundation design should be submitted to the Rly. before commencement of work.

1.14 TECHNICAL DATA SHEET FOR 16 MTRS.HIGH MAST AND COMPONENT

1. HIGH MAST STRUCTURE		
a	Height of Mast	16 Mtrs.
b	Material Construction	BS-EN 10 025, S 355
c	Thickness (in mm)	Top 3 (minimum) Bottom 4 (minimum)
d	Cross section of Mast in Polygon (Number of sides)	18 sides(Minimum)
e	Length of individual sections (in metre)	Top 5.52(Approx) Bottom 10.98 (Approx)
f	Base and top diameter	Top diameter 150 mm (minimum) Bottom diameter 460 mm (minimum)
g	Type of joints	Stress fit side joints.
h	Length of overlap	0.40 to 0.50 mt.(Approx)
i	Metal protection treatment for Mast section	Hot dip Galvanized through Single dip process.
j	Thickness of galvanization	70 microns (average) Top to bottom (minimum)
k	Size of Opening and door at base	1200 x 250mm
l	Type of locking arrangement and door panel	Double internal
m	Details of Slack board inside the base compartment	PVC Board 200 mmx 500 mmx 8 mm
n	Size material and thickness of cable terminal box	MCB Isolator
o	Thickness of base plate	25 mm
p	Size of anchor plate and thickness	Uniform PCD of 590 mm
q	Details of template	Uniform PCD of 590 mm
r	Weight in Kgs. of 16 mtrs. Mast(without accessories)	550 Kg.(minimum)

s	Lighting protection final	G.I. single spike of length 1200 mm
2. DYNAMIC LOADING AS PREVALING AT SITE		
a	Max. wind speed	As per IS 875 par 3
b	Factor of safety for other load	1: 15 (1.0 as per TR No-7)
3. FOUNDATION DETAILS		
a	Type of foundation	Open raft shallow footing
b	Size of foundation	As per design
c	Designed load bearing capacity	10 T per Sq. M at 2 M depth
d	Design safety factor	As per IS 456
e	Considered wind pressure(Kg/Mt ²)	As per IS 875 – 1987
f	Considered wind speed (Km /hr)	As per IS 875- 1987, 50 m/Sec
g	Depth of foundation	1875 mm and above
h	Average soil bearing capacity	As confirmed
i	Number of foundation bolts	8 Nos or more as per IS
j	PCD of foundation bolts	590 mm
k	Type of foundation bolts	EN- 8 grade with hot dipped galvanized as per BS 970 standards & should be supplied along with High mast from OEM only.
l	Bolt diameter	30 mm / 850 mm long (minimum)
m	Concrete grade	M-25
n	Checknut	Minimum 05 Nos for each bolts
o	Washer / spring washer	Minimum 02 Nos
4. LANTERN CARRIAGE		
a	Material of construction	50 NB ERW Class B- M.
b	Diameter of carriage ring (mm)	710 mm(I.D.) or as per design
c	Construction	To suit Lighting Design
d	Number of joints	2 Nos.
e	Buffer arrangement between carriage and Mast	PVC sleeve on carriage
f	Load carrying capacity	500 Kg.
g	Total weight of assembly with fittings	As per No. of Luminaires
h	Number of fittings /fixture	9 nos. (As per lighting design)
i	Type of fittings / fixtures	160 Watt LED
j	RCBO	4 Pole 16 A
h	Aviation Light	02 Nos (As per make list attached in Annexure-I)
5. WINCH		
a	Number of drums /Winch	Double drum type
b	Gear ratio	53:1
c	Capacity	500 Kg.
d	Method of operation	Manual / Electricals
e	Lubrication arrangement	Permanent oil bath.
f	Type of Lubricant	SAE 107/SAE 90
g	Tested load per drum	750 kgs. per drum, 1500 kgs for winch
6. STAINLESS STEEL WIRE ROPES		
a	Grade	AISI 316
b	No. of Ropes	2 continuous ropes

c	Construction	7/19
d	Center core materials	Stainless steel core
e	Diameter	6 mm (minimum)
f	Thimble & Talurit	SS Thimble
g	Braking load capacity	Minimum 2400kgs X2
h	Safety factor	> 5 for system at full load
7. CABLE		
a	Type	Trailing cable
b	Material	Copper Conductor, EPR insulated PCP Sheathed
c	Current carrying capacity	24 amps
d	Conductor size	2.5 sq.mm
e	No. of cores	5 Nos (minimum)
f	No. of Circuit	One/two
g	Coupler	Required
8. POWER TOOLS		
a	Model	Internal
b	Input supply	3 Phase, 415 volts
c	Wattage/ H.P.	750 watts/ 1.0 HP
d	Number of speed	Single speed
e	Operating speed	2 M / minute
9. TORQUE LIMITER		
a	Lifting capacity	Up to 750 Kgs,
b	Adjustable /Non-adjustable	Adjustable
c	Tripping device	Mechanical

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Three Phase RCBO of 16A-25A with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

NOTES-

1. Detail technical specification of High Mast lighting shall be submitted.
2. Typical illumination design of high mast shall be submitted.
3. The detail maintenance manual of high mast shall be submitted.
4. The contractor shall arrange the training for the Railway representative regarding operational mechanism of high mast.
5. The contractor shall arrange the required inspection facilities at manufacturer premises and inform the Rly. representative for the inspection. Inspection shall be carried out in accordance with the relevant specification and the test data and relevant specification shall be handed over to Rly. representative for record.
6. The contractor has to supply individual power tool for High Mast to make it self-sufficient for operation.
7. "Wind Tunnel Test" of High Mast shaft must be carried out successfully by the manufacturer. Wind Tunnel Test report shall be submitted.
8. Contractor shall submit detail foundation design for High Masts. They must also submit detail structural design of the High Mast, parameters considered for design shall be taken from the wind Tunnel Test.
9. Contractor shall specify the makes for the gadgets provided by him.
10. The erection cost of high mast also covers cost of foundation.
11. The luminaries and lamps provided should be guaranteed for one year.
12. High mast lighting structure shall be supplied duly inspected at manufacturer's premises by RITES or representative nominated by Sr.DEE(G)BSL
13. **The contractor should check Soil Bearing capacity and accordingly submit drawing for High Mast foundation duly signed by M.E.(Structures)/Civil Engineer.**

16.Schedule item no. 3**SETC of 20 Mtr. High Mast lighting tower with foundation along with 9x350 watt LED fittings complete with all accessories.**

The Work includes Supply, erection, testing and commissioning of 20 mtr. high mast lighting structure in 2 sections and hot dip galvanized including head frame, steel wire rope 6 mm dia.(7/19 construction), trailing cables, galvanized lantern carriage suitable for 9 nos. luminaries 350 Watt LED.& compact cast aluminium HID lamp control gear boxes, lighting finial, Double drum winch, Power tool, Aviation light with 2x10 W LED lamp (Bajaj model no. BJAOL-2 or as per list of makes Annexure-I), control panel housing contactors, single dial timer, RCBO 4 Pole 16A, MCBs for auto switching ON & OFF on preset time through timer and dusk to dawn controller to switch ON/OFF lights as per sunset / sunrise through photo sensing relay. Work includes casting of suitable foundation with M-25 concrete considering the safe soil bearing at site. All material & accessories shall be from OEM only. Suitable capacity for light to maintain lux levels more than so on ground level.

DETAIL SPECIFICATION FOR 20 MTR. HIGH MAST LIGHTING.**1.01 APPLICABLE STANDARDS**

The following shall be the Reference Standards for the High Mast.

Sr.No.	<u>Code No.</u>	<u>Title</u>
1	I.S.875(Part III) 1987	Code and practice for design loads for structures
2	BS EN 10025:2004 /DIN 17100 grade S355 J0	Grades of M.S. Plates
3	BS.5135/AWS	Welding
4	BS ISO 1461	Galvanizing

5	TR.No.7 2000 of ILE,UK	Specification for Mast and foundation
6	IS 2062	Mild Steel
7	IS 3459 / 2266	Stainless steel Wire rope
8	IS 9968 Part – 1	Trailing Cable
9	IS 325	Motor

1.02 **HIGH MAST**

1.02.1 **Structure :-** The High mast shall be of continuously tapered cross section, at least 18 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 part 3 1987. The mast dimension shall be as per enclosed datasheet.

1.02.2 Construction:- The mast shall be fabricated from special steel plates, conforming to BS-EN 10-025 or equivalent, cut and folded to form a polygonal section as stated at 1.02.1 above and shall be telescopically jointed and welded. The welding shall be in accordance with BS.5135/AWS. The procedural weld geometry and the workmanship shall be exhaustively tested on the completed welds. Mast shall be delivered to site in sections.

Each section shall be fabricated out of individual plates duly folded and welded. There shall be only one longitudinal seam weld per section. Sections fabricated out of multiple plates or with more than one weld shall not be accepted There shall not be any other internal or external welds in the mast sections.

At site the section shall be joined together by slip-stressed – fit method. No site welding or bolted joint shall be done on the mast. The minimum over lap distance shall be 1.5 times the diameter at penetration. The dimensions of the mast shall be based on proper design. Manufacturer of the mast must have conducted wind Tunnel test on their mast sample. Parameters considered for design shall be taken from the wind Tunnel Test.

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- hole 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 70 micron for the bottom and top sections. The mast sections shall be galvanized by single dipping method for better adhesion and life. Sections galvanized by double /multiple dipping methods shall not be accepted.

1.02.3 **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, cables, plug and socket, etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof 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 bucking of the mast section under heavy wind conditions.

1.02.4 **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(3 Second gust) and shall be measured at a height of 10 mtrs. Above ground level. The design life of the mast shall be minimum of 25 years.

1.03 **Lantern Carriage:**

- 1.03.1 **Fabrication:-** 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 designed and fabricated to hold the required number of 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 nylock 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.

- 1.03.2 **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 carriage, shall be made.

- 1.04 **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 the mast and the specially designed head frame assembly at the top.

- 1.04.1 **Winch:** - The winch shall be of completely self sustaining type, without the need for brake shoe, springs or clutches. Each driving spindle of the winch shall be positively locked when not in used, by gravity activated PAWLS. Individual drum also should be operated for fine adjustment of 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 as specified in datasheets. The winch shall self –lubricating type by means of an oil bath and 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 when the lantern carriage is fully lowered and rested on the rest pad. It should be possible to operate the winch manually by a suitable handle and /or by an integral power tool. Operation of the winch manual handle will be independent of the power tool. Winches with manual operation through the power tool shaft shall not be accepted. It shall be possible to remove the double drums after dismantling, through the door opening provided at base of the mast. Also, a winch gear box for simultaneous and reversible operation of the double drum winch shall be provided as part of the contract.

The winch shall be type tested in presence of reputed institution and the test certificates shall be furnished before supply of materials. A test certificate shall be furnished by the contractor from original equipment manufacturer, for each winch in support of maximum load operated by the winch.

- 1.04.2 **Head frame :-** The head frame which is to be designed as a capping unit of the mast, shall be 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 aluminum alloy (LM-6). Pulley made of synthetic materials

such as plastic or PVC are not acceptable. Self-lubricating bearing 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 :- The suspension system shall essentially be without any intermediate 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 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 construction of ropes the 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/ terminations, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.

1.05 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 connections 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. Size of the cable shall be minimum 5 core 2.5 sqmm copper.

The cable shall be of reputed make. At the top there shall be weather proof junction box to terminate the trailing cable. Connections from the top junction box to terminate to the individual luminaries shall be made by using 3 core 2.5 sqmm flexible PVC cables of reputed make. The system shall have in-built facilities for testing 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 assembly. The trailing cables of the lantern carriage rings shall be terminated by means of specially designed, metal clad, multipin plug and socket provided in the base compartment to enable easy disconnection when required. Automatic lighting ON-OFF based on dawn to dusk operation through suitable photo sensing relays and automatic switching ON/OFF at preset time through timer relay.

1.06 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 the lowering of the lantern carriage for maintenance purposes. The speed the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of the required rating. The power tool shall be supplied complete with a suitable control switch so that the operation of the Mast can be done at a safe distance. 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 be not only 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 problems with the electrically operated tool, shall be provided and shall incorporate a torque limiting device.

There shall be a separate torque-limiting device to protect the wire ropes from over stretching. It shall be mechanical with suitable load adjusting device. The torque limit or 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 limit or is a requirement as per the relevant standards in view of the over all safety of the system. Each Mast shall have its own power tool motor.

- 1.07 Lightning Finial :-** One number heavy duty hot dip galvanized lightning finial shall be provided for each mast. The lightning finial shall be minimum 1.2 meter 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 lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.
- 1.08 Aviation Obstruction Lights :-** Suitable Aviation Obstruction 02 Nos Lights of reliable design and reputed manufacturer shall be provided on top of each Mast.
- 1.09 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 lightning and electrical earthing of the Mast.
- 1.10 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 32 TPN switch, HRC fuses, double dial plus photo sensor timer, suitable size of contactors for lighting and power tool, 2 nos. outgoing, reversing switch for motor. Feeder pillar shall be mounted on suitable foundation near to the Mast.
 - a. Incoming Power Cable :-** 4 x 2.5 sqmm. Copper conductor armoured cable for motor supply shall be provided from feeder pillar to the base compartment of the High Mast. Cable shall be taken to the base compartment of the High Mast through the provision made in the foundation. Power cable of suitable size up to the feeder pillar, from supply point, shall be provided by the contractor. All the work for the power supply to the high mast shall be carried out by the contractor. Supply point to high mast will be made available suitably by laying of cable as separate schedule item and as per site requirement.
- 1.12 Luminaires :-** The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of 350-360 W, IP66, LED flood light fitting made of Matt black polyester powder coated pressure die cast aluminium housing. Matt black polyester powder coated pressure die cast aluminium frame with heat resistant toughened clear glass fixed with SS screw. LEDs are provided with secondary lens optics to get optimum optical performance. The driver used is specially designed to have built in surge voltage, open/short circuit protections. External surge protection provided for additional safety 4kV inbuilt & 10kV external. Luminaire is provided with a MS mounting bracket fixed on pressure die cast aluminum housing for aiming adjustment complete with all other accessories and fixing arrangements i.e. GI pipe, GI bracket / clamp, stainless steel nut bolts etc. as per site requirements. The cost shall also cover supply & laying of 3Cx2.5 sq.mm Cu cable for the individual wiring of the luminaire. The fittings shall be similar to model no. BJFL 350 W of M/s Bajaj make or similar model as per list of acceptable make enclosed. The technical parameter will generally be conforming to specification enclosed. Lumens- 120Lumens/W, Beam angle -30° , CRI >80, PF- >0.9. The flood light fitting should be got approved by Sr. DEE(G)BSL before supply.

1.13 FOUNDATION FOR HIGH MAST

Foundation for the high mast should be in accordance with the standard design of high mast manufacturer. Detailed foundation design should be submitted to the Rly. before commencement of work.

1.14 TECHNICAL DATA SHEET FOR 20 MTRS. HIGH MAST AND COMPONENTS

1. HIGH MAST STRUCTURE		
a	Height of Mast	20 Mtrs.
b	Material Construction	BS-EN 10 025, S 355
c	Thickness (in mm)	Top 3 or (minimum) Bottom 4 (minimum)
d	Cross section of Mast in Polygon (Number of sides)	18 sides (Minimum)
e	Length of individual sections	Top 9.62(Approx) Bottom 10.98 (Approx)
f	Base and top diameter	Top diameter 150 mm (minimum) Bottom diameter 460 mm (minimum)
g	Type of joints	Stress fit side joints.
h	Length of overlap	0.50 to 0.60 mt.(Approx)
i	Metal protection treatment for Mast section	Hot dip Galvanized through Single dip process.
j	Thickness of galvanization	Minimum 70 microns (average) Top to bottom
k	Size of Opening and door at base	1200 x 250mm
l	Type of locking arrangement and door panel	Double internal
m	Details of Slack board inside the base compartment	PVC Board 200 mmx 610 mmx 10 mm
n	Size material and thickness of cable terminal box	MCB Isolator
o	Thickness of base plate	25 mm
p	Size of anchor plate and thickness	Uniform PCD of 590 mm
q	Details of template	Uniform PCD of 590 mm
r	Weight in Kgs. of 20 mtrs. Mast(without accessories)	650 Kg.(minimum)
s	Lighting protection final	G.I. single spike of length 1200 mm
2. DYNAMIC LOADING AS PREVALING AT SITE		
a	Max. wind speed	As per IS 875 par 3
b	Factor of safety for other load	1: 15 (1.0 as per TR No-7)
3. FOUNDATION DETAILS		
a	Type of foundation	Open raft shallow footing
b	Size of foundation	As per design
c	Designed load bearing capacity	10 T per Sq. M at 2 M depth
d	Design safety factor	As per IS 456
e	Considered wind pressure (Kg/Mt ²)	As per IS 875 – 1987
f	Considered wind speed (Km /hr)	As per IS 875- 1987, 50 m/sec
g	Depth of foundation	≥2100 mm
h	Average soil bearing capacity	As confirmed
i	Number of foundation bolts	8 Nos / 12 Nos
j	PCD of foundation bolts	590 mm

k	Type of foundation bolts	EN- 8 grade with hot dipped galvanized as per BS 970 standards & should be supplied along with High mast from OEM only.
l	Bolt diameter	30 mm / 850 mm long (minimum)
m	Concrete grade	M-25
n	Checknut	Minimum 05 Nos for each bolts
o	Washer / spring washer	Minimum 02 Nos
4. LANTERN CARRIAGE		
a	Material of construction	50 NB ERW Class B- M.
b	Diameter of carriage ring (mm)	710 mm(I.D.) or as per design
c	Construction	To suit Lighting Design
d	Number of joints	2 Nos.
e	Buffer arrangement between carriage and Mast	PVC sleeve on carriage
f	Load carrying capacity	750 Kg.
g	Total weight of assembly with fittings	As per No. of Luminaires
h	Number of fittings /fixture	9 nos. (As per lighting design)
i	Type of fittings / fixtures	Suitable for model BGENF-14 (1 x 400 Watt) of Bajaj make.
j	RCBO	4 Pole 16 A
h	Aviation Light	02 Nos (As per make list attached in Annexure-I)
5. WINCH		
a	Number of drums /Winch	Double drum type
b	Gear ratio	53:1
c	Capacity	750 Kg.
d	Method of operation	Manual / Electricals
e	Lubrication arrangement	Permanent oil bath.
f	Type of Lubricant	SAE 107/SAE 90
g	Tested load per drum	750 kgs. per drum, 1500 kgs for winch
6. STAINLESS STEEL WIRE ROPES		
a	Grade	AISI 316
b	No. of Ropes	2 continuous ropes
c	Construction	7/19
d	Center core materials	Stainless steel core
e	Diameter	6 mm (minimum)
f	Thimble & Talurit	SS Thimble
g	Braking load capacity	Minimum 2400kgs X2
h	Safety factor	> 5 for system at full load
7. CABLE		
a	Type	Trailing cable
b	Material	Copper Conductor, EPR insulated PCP Sheathed
c	Current carrying capacity	24 amps
d	Conductor size	2.5 sq.mm
e	No. of cores	5 Nos (minimum)
f	No.of Circuit	One/two
g	Coupler	Required

8. POWER TOOLS		
a	Model	Internal
b	Input supply	1 Phase, 415 volts
c	Wattage/ H.P.	1100 watts/ 1.5 HP
d	Number of speed	Single speed
e	Operating speed	2 M / minute
9. TORQUE LIMITER		
a	Lifting capacity	Up to 750 Kgs,
b	Adjustable /Non-adjustable	Adjustable
c	Tripping device	Mechanical

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Three Phase RCBO of 16A-25A with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

NOTES-

1. Detail technical specification of High Mast lighting shall be submitted.
2. Typical illumination design of high mast shall be submitted.
3. The detail maintenance manual of high mast shall be submitted.
4. The contractor shall arrange the training for the Railway representative regarding operational mechanism of high mast.
5. The contractor shall arrange the required inspection facilities at manufacturer premises and inform the Rly. representative for the inspection. Inspection shall be carried out in accordance with the relevant specification and the test data and relevant specification shall be handed over to Rly. representative for record.
6. The contractor has to supply individual power tool for High Mast to make it self-sufficient for operation.
7. “Wind Tunnel Test” of High Mast shaft must be carried out successfully by the manufacturer. Wind Tunnel Test report shall be submitted.

8. Contractor shall submit detail foundation design for High Masts. They must also submit detail structural design of the High Mast, parameters considered for design shall be taken from the wind Tunnel Test.
9. Contractor shall specify the makes for the gadgets provided by him.
10. The erection cost of high mast also covers cost of foundation.
11. The luminaries and lamps provided should be guaranteed for five year.
12. High mast lighting structure shall be supplied duly inspected at manufacturer's premises by RITES or representative nominated by Sr.DEE(G)BSL
13. **The contractor should check Soil Bearing capacity and accordingly submit drawing for High Mast foundation duly signed by M.E.(Structures)/Civil Engineer.**

17.Schedule item no. 1

Supply, erection, testing & commissioning of 20 Mtrs. GI Stadium Mast as per Dimension: Top Dia.-150 mm, Bottom Dia. - 480 mm, Section- 2 (Section Length - 10300 mm.) Thick- T1- 4 /T2- 5 mm.Base Plate - 670 X 32 mm.PCD: 590; stadium Mast suitable to with stand wind speed 50 m/s with 11 nos LED FLOOD LIGHT Mounted in Asymmetrical arrangement, With Foundation Bolts : M30 X 850 X 12Sets., 32 Amp Feeder Pillar, Platform and Ring for housing LED Luminaires, Counterweightarrangement with fixing studs, Motorized accessories with winch,trailing cable,wire rope, SD LED AOL.

The Work includes Supply, erection, testing and commissioning of 20 mtr. stadium mast lighting structure in 2 sections and hot dip galvanized including head frame, steel wire rope 6 mm dia.(7/19 construction), trailing cables, galvanized lantern carriage suitable for 11 nos. luminaries 350 Watt LED.& compact cast aluminium HID lamp control gear boxes, lighting finial, Double drum winch, Power tool, Aviation light with 2x10 W LED lamp, control panel housing contactors, single dial timer, MCBs for auto switching ON & OFF on preset time through timer and dusk to dawn controller to switch ON/OFF lights as per sunset / sunrise through photo sensing relay. Work includes casting of suitable foundation with M-20 concrete considering the safe soil bearing at site. All material & accessories shall be from OEM only.

DETAIL SPECIFICATION FOR 20 MTR. STADIUM MAST LIGHTING.

1.01 APPLICABLE STANDARDS

The following shall be the Reference Standards for the stadium Mast.

Sr.No.	<u>Code No.</u>	<u>Title</u>
1	I.S.875(Part III) 1987	Code and practice for design loads for structures
2	BS EN 10025:2004 /DIN 17100 grade S355 J0	Grades of M.S. Plates
3	BS.5135/AWS	Welding
4	BS ISO 1461	Galvanizing
5	TR.No.7 2000 of ILE,UK	Specification for Mast and foundation
6	IS 2062	Mild Steel
7	IS 3459 / 2266	Stainless steel Wire rope
8	IS 9968 Part – 1	Trailing Cable
9	IS 325	Motor

1.02 **STADIUM MAST**

1.02.1 **Structure :-** The stadium mast shall be of continuously tapered cross section, at least 18 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 part 3 1987. The mast dimension shall be as per enclosed datasheet.

1.02.2 **Construction:-** The mast shall be fabricated from special steel plates, conforming to BS-EN 10-025 or equivalent, cut and folded to form a polygonal section as stated at 1.02.1 above and shall be telescopically jointed and welded. The welding shall be in accordance with BS.5135/AWS. The procedural weld geometry and the workmanship shall be exhaustively tested on the completed welds. Mast shall be delivered to site in sections.

Each section shall be fabricated out of individual plates duly folded and welded. There shall be only one longitudinal seam weld per section. Sections fabricated out of multiple plates or with more than one weld shall not be accepted. There shall not be any other internal or external welds in the mast sections.

At site the section 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. The dimensions of the mast shall be based on proper design. Manufacturer of the mast must have conducted wind Tunnel test on their mast sample. Parameters considered for design shall be taken from the wind Tunnel Test.

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- hole 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 70 micron for the bottom and top sections. The mast sections shall be galvanized by single dipping method for better adhesion and life. Sections galvanized by double /multiple dipping methods shall not be accepted.

1.02.3 **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, cables, plug and socket, etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof 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 300 mm to avoid bucking of the mast section under heavy wind conditions.

1.02.4 **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 (3 Second gust) and shall be measured at a height of 10 mtrs. above ground level. The design life of the mast shall be minimum of 25 years.

1.03 **Lantern Carriage:**

1.03.1 **Fabrication:-** 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 designed and fabricated to hold the required number of 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 nylock 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.

1. 03.2 **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 carriage, shall be made.

- 1.04 **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 the mast and the specially designed head frame assembly at the top.

- 1.04.1 **Winch:** - The winch shall be of completely self sustaining type, without the need for brake shoe, springs or clutches. Each driving spindle of the winch shall be positively locked when not in use, by gravity activated PAWLS. Individual drum also should be operated for fine adjustment of 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 as specified in datasheets. The winch shall self –lubricating type by means of an oil bath and 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 when the lantern carriage is fully lowered and rested on the rest pad. It should be possible to operate the winch manually by a suitable handle and /or by an integral power tool. Operation of the winch manual handle will be independent of the power tool. Winches with manual operation through the power tool shaft shall not be accepted. It shall be possible to remove the double drums after dismantling, through the door opening provided at base of the mast. Also, a winch gear box for simultaneous and reversible operation of the double drum winch shall be provided as part of the contract.

The winch shall be type tested in presence of reputed institution and the test certificates shall be furnished before supply of materials. A test certificate shall be furnished by the contractor from original equipment manufacturer, for each winch in support of maximum load operated by the winch.

- 1.04.2 **Head frame :-** The head frame which is to be designed as a capping unit of the mast, shall be 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 aluminum alloy (LM-6). Pulley made of synthetic materials such as plastic or PVC are not acceptable. Self-lubricating bearing 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 :- The suspension system shall essentially be without any intermediate 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 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 construction of ropes the 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/ terminations, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.

1.05 Electrical system, cable and cable connections:-

A suitable terminal box shall be provided as part of the contract at the base compartment of the stadium mast for terminating the incoming cable. The electrical connections 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. Size of the cable shall be minimum 5 core 2.5 sqmm copper.

The cable shall be of reputed make. At the top there shall be weather proof junction box to terminate the trailing cable. Connections from the top junction box to terminate to the individual luminaries shall be made by using 3 core 1.5 sqmm flexible PVC cables of reputed make. The system shall have in-built facilities for testing 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 assembly. The trailing cables of the lantern carriage rings shall be terminated by means of specially designed, metal clad, multipin plug and socket provided in the base compartment to enable easy disconnection when required. Automatic lighting ON-OFF based on dawn to dusk operation through suitable photo sensing relays and automatic switching ON/OFF at preset time through timer relay.

1.06 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 the lowering of the lantern carriage for maintenance purposes. The speed the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of the required rating. The power tool shall be supplied complete with a suitable control switch so that the operation of the Mast can be done at a safe distance. 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 be not only 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 problems with the electrically operated tool, shall be provided and shall incorporate a torque limiting device.

There shall be 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.

1.07 Lightning Finial :- One number heavy duty hot dip galvanized lightning finial shall be provided for each mast. The lightning finial shall be minimum 1.2 meter 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 lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.

1.08 Aviation Obstruction Lights :-Suitable Aviation Obstruction 02 Nos Lights of reliable design and reputed manufacturer shall be provided on top of each Mast.

1.09 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 lightning and electrical earthing of the Mast.

1.10 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 32 TPN switch, HRC fuses, double dial plus photo sensor timer, suitable size of contactors for lighting and power tool, 2 nos. outgoing, reversing switch for motor. Feeder pillar shall be mounted on suitable foundation near to the Mast.

1.11 Incoming Power Cable :- 4 x 2.5 sqmm. Copper conductor armoured cable for motor supply shall be provided from feeder pillar to the base compartment of the stadium Mast. Cable shall be taken to the base compartment of the stadium Mast through the provision made in the foundation. Power cable of suitable size up to the feeder pillar, from supply point, shall be provided by the contractor. All the work for the power supply to the stadium mast shall be carried out by the contractor. Supply point to stadium mast will be made available suitably by laying of cable as separate schedule item and as per site requirement.

1.12 Luminaires :- The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of 350W, IP66, LED flood light fitting made of Matt black polyester powder coated pressure die cast aluminium housing. Matt black polyester powder coated pressure die cast aluminium frame with heat resistant toughened clear glass fixed with SS screw. LEDs are provided with secondary lens optics to get optimum optical performance. The driver used is specially designed to have built in surge voltage, open/short circuit protections. External surge protection provided for additional safety 4kV inbuilt & 10kV external. Luminaire is provided with a MS mounting bracket fixed on pressure die cast aluminum housing for aiming adjustment complete with all other accessories and fixing arrangements i.e. GI pipe, GI bracket / clamp, stainless steel nut bolts etc. as per site requirements. The cost shall also cover supply & laying of 3Cx2.5 sq.mm Cu cable for the individual wiring of the luminaire. The fittings shall be similar to model no. BJFL 350 W of M/s Bajaj make or similar model as per list of acceptable make enclosed. The technical parameter will generally be conforming to specification enclosed. Lumens-120Lumens/W, CRI >80, PF- >0.9. The flood light fitting should be got approved by Sr. DEE(G)BSL before supply.

1.13 FOUNDATION FOR STADIUM MAST

Foundation for the stadium mast should be in accordance with the standard design of stadium mast manufacturer. Detailed foundation design should be submitted to the Rly. before commencement of work.

1.15 TECHNICAL DATA SHEET FOR 20 MTRS. STADIUM MAST AND COMPONENTS

2. STADIUM MAST STRUCTURE

a	Height of Mast	20 Mtrs.
b	Material Construction	BS-EN 10 025, S 355
c	Thickness (in mm)	Top 4 (minimum) Bottom 5 (minimum)
d	Cross section of Mast in Polygon (Number of sides)	18 sides(Minimum)
e	Length of individual sections	10300 MM Each.

f	Base and top diameter	Top diameter 150 mm (minimum) Bottom diameter 480 mm (minimum)
g	Type of joints	Stress fit side joints.
h	Length of overlap	0.60 mt.(Approx)
i	Metal protection treatment for Mast section	Hot dip Galvanized through Single dip process.
j	Thickness of galvanization	70 microns (average) Top to bottom (minimum)
k	Size of Opening and door at base	1200 x 300mm
l	Type of locking arrangement and door panel	Double internal
m	Details of Slack board inside the base compartment	PVC Board 200 mmx 610 mmx 10 mm
n	Size material and thickness of cable terminal box	MCB Isolator
o	Thickness of base plate	32 mm
p	Size of anchor plate and thickness	Uniform PCD of 590 mm
q	Details of template	Uniform PCD of 590 mm
r	Weight in Kgs. of 20 mtrs. Mast (without accessories)	650 Kg.(minimum)
s	Lighting protection final	G.I. single spike of length 1200 mm

2. DYNAMIC LOADING AS PREVALING AT SITE

a	Max. wind speed	As per IS 875 par 3
b	Factor of safety for other load	1: 15 (1.0 as per TR No-7)

3. FOUNDATION DETAILS

A	Type of foundation	Open raft shallow footing
B	Size of foundation	As per design
C	Designed load bearing capacity	10 T per Sq. M at 2 M depth
D	Design safety factor	As per IS 456
E	Considered wind pressure (Kg/Mt2)	As per IS 875 – 1987
F	Considered wind speed (Km /hr)	As per IS 875- 1987, 50 m/sec
G	Depth of foundation	Minimum 2200 mm above PCC upto GL & 300 mm above GL
H	Average soil bearing capacity	As confirmed
I	Number of foundation bolts	Minimum 12 Nos
J	PCD of foundation bolts	590 mm
k	Type of foundation bolts	EN- 8 grade with hot dipped galvanized as per BS 970 standards & should be supplied along with stadium mast from OEM only.
l	Bolt diameter	30 mm / 850 mm long (minimum)
m	Concrete grade	M-25
n	Checknut	Minimum 05 Nos for each bolts
o	Washer / spring washer	Minimum 02 Nos

4. LANTERN CARRIAGE

a	Material of construction	50 NB ERW Class B- M.
b	Diameter of carriage ring (mm)	710 mm(I.D.) or as per design
c	Construction	To suit Lighting Design
d	Number of joints	2 Nos.
e	Buffer arrangement between carriage and Mast	PVC sleeve on carriage
f	Load carrying capacity	750 Kg.
g	Total weight of assembly with fittings	As per No. of Luminaires
h	Number of fittings /fixture	11 nos. (As per lighting design) Counterweight arrangement with fixing studs
i	Type of fittings / fixtures	Counterweight arrangement with fixing studs.
j	RCBO	4 Pole 16 A
h	Aviation Light	02 Nos (As per make list attached in Annexure-I)

5. WINCH

a	Number of drums /Winch	Double drum type
b	Gear ratio	53:1
c	Capacity	750 Kg.
d	Method of operation	Manual / Electricals
E	Lubrication arrangement	Permanent oil bath.
f	Type of Lubricant	SAE 107/SAE 90
g	Tested load per drum	750 kgs. per drum, 1500 kgs for winch

6. STAINLESS STEEL WIRE ROPES

a	Grade	AISI 316
b	No. of Ropes	2 continuous ropes
c	Construction	7/19
d	Center core materials	Stainless steel core
e	Diameter	6 mm (minimum)
f	Thimble & Talurit	SS Thimble
g	Braking load capacity	Minimum 2400kgs X2
h	Safety factor	> 5 for system at full load

7. CABLE

a	Type	Trailing cable
b	Material	Copper Conductor, EPR insulated PCP Sheathed
c	Current carrying capacity	24 amps
d	Conductor size	2.5 sq.mm
e	No. of cores	5 Nos (minimum)
f	No.of Circuit	One/two
g	RCBO	4 Pole 16 A
h	Coupler	Required

8. POWER TOOLS

a	Model	Internal
b	Input supply	1 Phase, 415 volts
c	Wattage/ H.P.	1100 watts/ 1.5 HP
d	Number of speed	Single speed
e	Operating speed	2 M / minute

9. TORQUE LIMITER

a	Lifting capacity	Up to 750 Kgs,
b	Adjustable /Non-adjustable	Adjustable
c	Tripping device	Mechanical

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Three Phase RCBO of 16A-25A with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

NOTES-

1. Detail technical specification of stadium Mast lighting shall be submitted.
2. Typical illumination design of stadium mast shall be submitted.
3. The detail maintenance manual of stadium mast shall be submitted.
4. The contractor shall arrange the training for the Railway representative regarding operational mechanism of stadium mast.
5. The contractor shall arrange the required inspection facilities at manufacturer premises and inform the Rly. representative for the inspection. Inspection shall be carried out in accordance with the relevant specification and the test data and relevant specification shall be handed over to Rly. representative for record.
6. The contractor has to supply individual power tool for stadium Mast to make it self-sufficient for operation.
7. “Wind Tunnel Test” of stadium Mast shaft must be carried out successfully by the manufacturer. Wind Tunnel Test report shall be submitted.

8. Contractor shall submit detail foundation design for stadium Masts. They must also submit detail structural design of the stadium Mast, parameters considered for design shall be taken from the wind Tunnel Test.
9. Contractor shall specify the makes for the gadgets provided by him.
10. The erection cost of stadium mast also covers cost of foundation.
11. The luminaries and lamps provided should be guaranteed for one year.
12. Stadium mast lighting structure shall be supplied duly inspected at manufacturer's premises by RITES or representative nominated by Sr.DEE(G)BSL
13. **The contractor should check Soil Bearing capacity and accordingly submit drawing for Stadium Mast foundation duly signed by M.E.(Structures)/Civil Engineer.**

18.Schedule Item No. 35

Supply, erection, testing & commissioning of 7 m high (clear height) galvanised octagonal pole with bracket (Single/Double arm as per site requirement), internal wiring foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation.(Along with 2 pole RCBO 6A, with 30 mA sensitivity).

The price shall cover the cost of Supply, Erection, Testing, commissioning of 7 m high (clear height) galvanized octagonal pole with arm bracket, foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation. The poles should be hot dip galvanized after fabrication, internally & externally in accordance with IS-2629/BSEN ISO 1461 or equivalent. The steel poles is as per BSEN 10025 grade S 355 Jo or equivalent.

Sr. No.	Description	Particular
1	Base plate	IS 2062
2	Yield Strength	Min 355 N/mm ²
3	Tensile Strength	490-630 N/mm ²
4	Pole Height	7 mtr
5	Top Dia	70 mm
6	Bottom dia	130 mm
7	Sheet Thickness	Min 3 mm
8	Base Plate Dimensions (LxBxT)-	225x225x16 mm
9	Bolt Size	4 Nos 20 mm dia.
10	Pitch Circle dia	225 mm
11	Bolt Length	700 mm
12	Projected Bolt length	100 mm
13	Anchor plate thickness	3 mm

1. The octagonal poles shall be hot dipped galvanized in single dip with **minimum** coating thickness of 65 micron DFT as per IS :2629/ IS :2633/ IS: 4759 standards.
2. The octagonal poles are designed for maximum wind speed of 169 Km/Hr.
3. The octagonal poles are manufactured in single section.
4. The structure shall confirm to IS : 875 – part 3 : 1987 relating to wind load on structures and also confirm to BSEN 40-I:1992 relating to general construction if applicable.
5. Bending of sheet into polygonal shape shall be done through a CNC controlled. Laser aligned will be as per IS : 1367.

Note :- Connection to the street light fittings shall be given through inside the pole with flexible, 3- core, multistrand copper conductor, PVC insulated & sheathed wire.

RCBO - It shall be 2 pole type Earth leakage circuit breaker of rating 6 amps with rated residual operating current of 30 mA. with enclosure. It shall be provided with rotary handle with ON/OFF indication, positive contact indication along with test button for regular inspection. It shall be Conforming to IS 12640-1/2000.

It shall be erected in an approved manner as per site condition & instructions of field supervisor.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

19.Schedule item no. 4

Fabrication, supply and erection of Fencing around the high mast in square shape size 2M x 2M and height 1.5M from ground level fabricated from MS angle size 40x40x6mm, MS Flat size 40x6mm and wire mesh made of 8SWG wire and 1M wide hinged type lockable door as per drawing approved by Railway including grouting, CC platform around the high mast above 0.30M above ground level and painting etc. complete as per site requirement.

The price shall cover fabrication, supply and erection of Fencing around the high mast in square shape size 2M x 2M and height 1.5M from ground level fabricated from MS angle size 40x40x6mm, MS Flat size 40x6mm and wire mesh made of 8SWG wire and 1M wide hinged type lockable door as per drawing approved by Railway including grouting, CC platform around the high mast above 0.30M above ground level and painting etc. complete as per site requirement.

20.Schedule item no. 27

Providing & erecting Hot dipped Galvanised Perforated type cable tray manufactured from 16 SWG (1.6 mm thick) GI sheet of 300 mm width & 100 mm height comprising all required standard accessories.

The price shall cover cost of design, manufacturing, supply, transportation and unloading to site including erection of hot dipped galvanized (7 Tank Process) (Thickness of galvanization \geq 75 microns) Perforated type cable tray manufactured from 16 SWG (1.6mm thick) GI sheet of 300 mm width & 100 mm height comprising all required standard accessories. Providing & erecting cable tray complete with necessary coupler plates & hardware shall be in approved manner.

The work involves the connecting and fixing arrangements with coupler plate, fasteners etc. as per site requirement. The perforated cable trays should be of standard length 2500 mm. The sample of cable tray shall be got approved by Sr. DEE (G) BSL before supply.

21.Schedule item no. 25, 26

SETC of LT Outdoor type panel as per IEC 61439 with double door powder coated with locking arrangements consisting of 1 Nos x 200 A 4P MCCB, 4 Nos x 63 A 4P MCCB With ELR & CBCT for each MCCB, multifunctionmeter, indication lamp, copper busbar, & other associate accessories. All MCCB are Microprocessor based (completely wired with suitable communication

cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)

SETC of LT Outdoor type panel as per IEC 61439 with double door powder coated withlocking arrangements consisting of 1 Nos x 125 A 4P MCCB as I/C and 4 Nos x 63 A 4P MCCB With ELR & CBCT for each MCCB, multifunctionmeter, indication lamp, copper busbar, & other associate aceesories. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)

This specification covers design, manufacture supply, erection, testing and commissioning of cubicle type sheet steel floor mounting, LT panel board for distribution of power.

SYSTEM PARTICULARS:-

RATED VOLTAGE	440 VOLT 3 PHASE 4 WIRE
RATED FREQUENCY	50 HZ.
MAX. AMBIENT TEMPERATURE	55° C
IP rating	Minimum IP 55
Compliance	IEC 61439

1. SCOPE

- This Specification covers the design, engineering, manufacture, testing at manufacturer's works before dispatch, packing, forwarding and delivery, supervision of erection, testing at site and commissioning of cubicle type indoor, floor mounted, dust and vermin proof main free standing 415V LT distribution panel / sub distribution panels as per the rating and configuration stated in BOQ complete with all accessories such as protection relays, control wiring, auxiliary contacts, indicating lamps etc.

2. STANDARDS

- In general, the equipment shall conform to all relevant IS/IEC standards. In case of any contradiction between the IS/IEC and this specification, the more stringent of the two shall apply.

STANDARD	DESCRIPTION
IEC 61439	Low-voltage switchgear and control gear assemblies
IEC 60228	Conductors of insulated cables
IEC 60255	Measuring relays and protection equipment
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60831	Shunt power capacitors of the self-healing type for AC systems having a rated voltage up to and including 1000 V
IEC 60871	Shunt capacitors for AC power systems having a rated voltage above 1000 V
IEC 60898	Electrical accessories – Circuit-breakers for over current protection for household and similar installations
IEC 60947-6-1/EN 60947-6-1	low-voltage and control gear Multiple function equipment. Automatic transfer switching equipment.
IEC 60947-2/EN 60947-2	Specification for low-voltage switchgear and control gear circuit breakers
IEC 60947-1	Specification for low-voltage switchgear and control gear. Contactors and motor- starters. Electromechanical contactors and motor-starters.
IEC 61008	Residual current operated circuit-breakers without integral over current protection for household and similar uses (RCCBs)
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against mechanical impacts(IK code)

IEC 61641	Enclosed low-voltage switchgear and control gear assemblies - Guide for testing under conditions of arcing due to internal fault.
IEC 61869/ BSEN 61869	Instrument transformers
IS 13779	ac Static Watt-hour Meters, Class 1 and 2
IS 13947-5-2	Low-Voltage Switchgear and Control gear, Part 5: Control Circuit Devices and Switching Elements, Section 2: Proximity Switches
IS 13947-5-1	Low-Voltage Switchgear and Control gear, Part 5: Control Circuit Devices and Switching Elements, Section 1: Electromechanical Control Circuit
IS 13947-4-1	Low-Voltage Switchgear and Control gear : Part 4 - Contractors and Motor-Starters
IS 13947-3	Low voltage switchgear and control gear, part 3: switches, disconnectors, switch-disconnectors and fuse combination units
IS 13947-2	Low-Voltage Switchgear and Control gear, Part 2: Circuit Breakers
IS 13947-1	Low-voltage switchgear and control gear, Part 1: General rules
IS 5553	Reactors – Specification

3. SWITCHBOARD CONSTRUCTIONAL FEATURES

- The LV switchboards should be certified for compliance with IEC 61439-1 and 2 standards. Their construction, including switchgear, control gear, busbar supports, busbar orientation, and busbar links, shall be identical to the assembly that has compliance tested as per standard.
- The LV switchboards shall be manufactured in accordance with switchgear OEM design guidelines, ensuring full compliance with IEC 61439 standards. The type test certification shall be done by OEM and franchisee shall carry out assembly as per type tested design. To ensure compatibility, both the panel design and the switchgear components (ACB/MCCB/Control gear etc) should be from same OEM. The type designation and certification label on the panel shall prominently feature the OEM's name.
- Manufacturing / Assembly should be done at authorized franchisee works proposed by the switchgear OEM and an authorization certificate must be submitted prior to order finalization.
- The General Arrangement (GA) prepared by the franchisee must be verified by the OEM, who will authenticate it with their signature and stamp with designation and contact number.
- The OEM shall submit type test certificates/reports from an independent test lab (i.e., ASTA, ERDA, or CPRI) for design verification via methods and tests specified in Annexure D of IEC 61439, based on the feeder Incomer's rating, at the time of drawing approval.
- The Switchboards shall be metal clad totally enclosed, floor mounted freestanding, fully compartmentalized bolted type of modular extensible design suitable for indoor mounting.
- All covers and doors provided shall offer adequate safety to operating persons and provide ingress protection as per BOQ.
- Switchboard panels and cubicles shall be fabricated with load bearing members with not less than 2 mm and shall be folded and braced as necessary to provide a rigid support for all components. The doors and covers shall be fabricated from CRCA sheet steel of thickness not less than 1.6 mm.
- The front of the compartment shall feature a concealed hinged door with a key-operated

- metal camlock, providing secure locking facilities that enhance safety, improve aesthetics, and increase security.
- All doors and covers shall also be fully gasketed with EPDM gaskets to prevent any ingress of dust and vermin.
- Switchboards shall meet the minimum ingress protection (IP) requirements:
 - Indoor applications: IP42
 - Outdoor installations: Min IP55
- There should be generous availability of space for ease of installation and maintenance with adequate safety for working in one vertical section without encountering any live parts.
- **Note – (1) All incoming and outgoing MCCB should be 4 pole microprocessor based with adjustable short circuit, overload, ground fault (LSIG) and earth leakage protection (ELR with CBCT for each MCCB required).**
- **(2) Electrical interlocking between MCCB to be done.**
- **(3) Busbar shall be of copper only.**
- **(4) Busbar size should be same for phase and neutral.**
- **(5) Indicating lamp LED type required for outgoing and incoming supply**

4. SWITCHBOARD COMPARTMENTALIZATION

- For compartmentalized switchboards, separate totally enclosed compartments shall be provided for horizontal bus bars, vertical bus bars, ACBs, MCCBs and cable alleys.
- Hinged lockable doors for each separate compartment shall be provided and duly interlocked with the breaker in "ON" and "OFF" position.
- For all Circuit Breakers separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contactors and control MCB etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bars and connections.
- Cable compartments shall be of adequate size for easy termination of all incoming and outgoing cables entering from bottom or top.

5. SWITCHBOARD BUS BARS

- The ratings and configuration of bus bars shall be as per type tested design of OEM.
- The bus bars shall be extensible on either side of the switchboard.
- The bus bars shall be supported on non-breakable, non-hygroscopic SMC insulated supports at regular intervals, to withstand the forces arising from a fault level as stipulated in schedule of quantities. 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 25mm and phases/ live parts/ neutral to ground shall be 19mm except on the equipment terminals.
- **Busbar shall be of copper only.** The current carrying capacity shall be as per IEC 61439.

6. EARTHING

- One earthing terminal shall be provided on each side of switchboard.
- An earth bar size must be at least 1: 6 x 50 sq mm Aluminium (same can be provided with GI or Cu also, if required). Provision for arrangement for 2: 6x50 sq mm shall be possible, if required.
- The earth bar shall be electrically continuous and shall run the full extent of each board.

- Door earthing shall be provided for all doors.

7. INSTRUMENT ACCOMODATION

- Instruments and indicating lamps shall not be mounted on the Air Circuit Breaker Compartment door. A separate and adequate compartment shall be provided, and the instrumentation shall be accessible for testing and maintenance without danger of accidental contact with live parts of the Switchboard.
- For MCCBs, instruments and indicating lamps can be provided on the compartment doors.
- The current transformers for metering and for protection shall be mounted on the solid aluminium bus bars/cables (for wire feeders) with proper supports.

8. WIRING

- All wiring for relays and meters shall be with PVC insulated copper conductor wires.
- 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.

9. CABLE TERMINATION

- Knockout holes of appropriate size and number shall be provided in the Switchboard in conformity with the location of incoming and outgoing conduits/cables.
- The cable terminations of the Circuit Breakers shall be brought out to terminal cable sockets suitably located.
- The cable terminations for the MCCB's shall be brought out to the rear in the case of rear access switchboards.
- Removable gland plates shall be provided for power and control cables. The gland plates shall be 3 mm thick and for single core cables shall be of non-magnetic material.

10. PAINTING AND FINISHING

- 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.

11. NAME PLATES AND LABLES

- 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.

12. TESTING AND INSPECTION

- The switchgear shall be completely assembled, wired, adjusted and all routine tests as specified by the applicable standard code shall be conducted.
- Visual Inspection and Dimensional Check.
- Verification of Bill of Material.
- Check of conformity with wiring diagrams and plans.
- Functional test for control circuits.
- Tightness of screwed/bolted connections.
- Electrical & mechanical operational checks.

Note –

- 1) A base channel of 50 mm x 50 mm fabricated out of 3 mm thick hot rolled sheet steel galvanized shall be provided to prevent corrosion of the sheet steel cubicles and facilitate cleaning of floors. All switches shall be operatable from front.
- 2) The LT panel shall be floor mounting type comprising or following items suitably on ½ ft. height foundation or Iron angle frame.

SWITCH FUSE UNITS :- Air-Brake, Heavy Duty SFU switch with HRC fuses for incoming and outgoing supply shall be provided Switch fuse unit shall be confirming to IS 13947 pt-3 1993 or latest and HRC fuse confirming to IS 13703 – PT-1&2 -1993 or latest. All SFU should be 4 pole. The panel board shall be provided with following Items:-

CHANGE OVER SWITCH- 4 pole, 415 volt onload changeover switch as per IS 13947 (Pt-I&III).

MCCB- MCCB- General Scope

- The circuit breakers shall comply with the requirement of IEC 60947, IS/IEC 60947-2. MCCBs shall be suitable for operational voltage of 3 phase 415 Volts AC 50/60 HZ supply.
- The circuit breaker shall comply with the isolation function requirement of IEC 60947-2, IS/IEC 60947-2
- MCCBs shall be suitable for 3 Phase 690 Volts AC 50 HZ supply. Rated insulation voltage (Ui) 800 V AC and rated Impulse voltage 8 KV.
- They shall be of utilization category A.
- Reference ambient temperature: 40°C.
- MCCB should not have any deration up to 50°C.
- No rating derations in MCCB till 2000-meter altitude.
- The circuit breaker shall provide IP 2X protection for insulation between the front cover and internal power circuits to avoid any accidental contact with the live main current carrying path with the front cover open.
- All products should have BIS certification.
- MCCBs should have $I_{cs}=I_{cu}$ with Minimum fault level as specified in SOQ.
- MCCBs should Microprocessor based releases with LSIG protection. MCCBs shall be suitable for 3 Phase 415 Volts AC 50/60 Hz supply with rated insulation voltage (Ui) of 800VAC and rated Impulse voltage (U_{imp}) of 8 kV.
- The MCCB shall have rated ultimate short circuit breaking capacity (I_{cu}) equal to rated service short circuit breaking capacity (I_{cs}) as per the attached table at 415 volts AC.

	Up to 100A	101- 160A	161-630A
I_{cu} (kA)	25	25	36/50
I_{cs} (kA)	25	25	36/50

- MCCBs shall be designed for both vertical and horizontal mounting, as per recommendation of manufacturer, without any adverse effect on electrical performance.
- True-RMS sensing should be present.
- It shall be possible to supply power either from the upstream or downstream side i.e. there should be no Load-line bias.
- MCCBs shall provide double insulation between the live power parts and the front part of MCCB.
- Manufacturer must furnish Type test certificates of all the models of MCCBs from acceptable, NABL accredited and reputed laboratories to prove the same, if so desired by Engineer.

- The double break mechanism should have Contact Locking Dead-Centre (D/C) mechanism.
- In case of 3 ph, 4 wire system, 4 pole MCCBs to be used.
- All microprocessor based MCCB, the release must have Thermal memory as a standard feature, and there should be provision to defeat Thermal Memory.

Construction & Operation

- MCCB should be supplied along with Extended Rotary handle for interlocking so that it should be possible to ON/OFF MCCB without opening the panel.
- All poles shall operate simultaneously for circuit breaker opening, closing, and tripping.
- MCCBs shall be actuated by a handle that clearly indicated the three positions: ON, OFF and TRIP.
- To ensure suitability for isolation complying with IEC 60947-2.
 - The operating mechanism shall be designed such that the handle can only be in OFF and TRIP position if the power contacts are all separated.
 - The MCCB knob should indicate the true position of the contacts.
 - The MCCB should be provided with disconnecting functions with positive isolation features in both OFF and TRIP position.
- MCCBs shall be equipped with a “push to trip” button in front to test operation and opening of the poles.
- The design & operating principal of MCCB should be of current limiting design with extremely low trip times under short circuit conditions and low thermal stress with compact size and independent manual operation.
- All MCCBs above 63A shall be provided with Silver Plated Copper Spreader Links for enhancing termination capacity.
- Operating mechanism of the MCCB shall be quick make, quick break and trip-free type.
- Protection setting can be adjusted from front.
- The release should be shrouded from the front to prevent unauthorized access.

Protection Functions for MCCBs

- Microprocessor-based release the O/L adjustment settings should be from 25% - 100 % and S/C for 1.5 to 12 times.
- Variable earth fault settings should be preferred as per manufacturer’s claims.
- Electronic trip units shall comply with the requirements as specified in Appendix-F (EMC/EMI Compatibility) of IEC 60947-2 or EN 60947-2.
- There should be provision of Thermal Memory ON-OFF from the release front fascia itself.
- MCCBs shall be designed to enable safe on-site installation of auxiliaries such as voltage releases (shunt and under voltage releases) and indication switches as follows:
 - They shall be separated from power circuits.
 - All electrical auxiliaries shall be of the snap-in-type.
 - The addition of auxiliaries shall not increase the volume of the circuit breaker.
- The degree of protection of MCCBs should be IP54 (with extended Handle)
- MCCBs should have extended rotary operating handle for easy operation. Door interlock & door defeat feature should be available with extended rotary handles.
- Phase barriers should be an integral part of the MCCBs.
- MCCBs of 63A and above shall be provided with Spreader Links for enhancing termination capacity.

- The MCCB feeder should be equipped with adjustable earth leakage sensing device 0.3A -30A & CBCT and Shunt trip.

Note – (1)All incoming and outgoing MCCB should be 4 pole microprocessor based with adjustable short circuit, overload, ground fault (LSIG) and earth leakage protection (ELR with CBCT for each MCCB required).

(2) Electrical interlocking between MCCB to be done.

(3) Busbar shall be of copper only.

(4) Busbar size should be same for phase and neutral.

(5) Indicating lamp LED type required for outgoing and incoming supply

MCB:- Miniature circuit breaker ‘C’ Class of 10 kA breaking cap. for outgoing supply. MCB as per IEC60947-2.

Contactors :- 4 Pole power contactor, AC1 Rating 440 Volt AC 50 Hz. Conform to IS /IEC 60947-4-1

MCB DB- MCB Distribution board consisting with various capacity of MCB's as in schedule. MCB shall be ‘C’ Class, of 10 kA breaking capacity and conforming to IEC60947-2 with latest amendments. MCB shall be with ON/OFF indication, IP 20 degree protection, MCB shall be having bi-connect terminals, load-line reversibility and with energy limitation class –III features.

The MCB Distribution board should conform to IEC61439-3 standard. It shall be provided with cements spill protection and side locking DIN bar interchangeable door.

ACB- ACB shall be microprocessor based EDO type having breaking capacity 50 kA with following features.

- 4 pole conforming to IS/IEC- 60947 (Part 1 & 2)
- High short time withstand capacity. $I_{cu}=I_{cs}=I_{cw}$ for 1 sec total selectivity.
- High mechanical and electrical operating life.
- Advanced micro-processor based protection release with LSING protection & type of fault indication.
- 50% and 200% neutral protection solution
- RoHS compliant.
- Inbuilt Electrical and Mechanical Anti-Pumping prevent multiple breaker closures due to persistent closing command
- CE marking.
- Arc-chute interlocking prevents the closure of breaker if arc-chute is missing or not properly installed.
- Smart-racking shutter interlock ensures breaker is switched off before racking out the breaker.
- Conforms to Glow wire Testing.
- .ACB Release should provide overload / Short Circuit/Instantaneous/Ground fault & Neutral current protection
IS/IEC 60947-2 & IEC 60947-2.
- Electrical Interlocking between ACB/Switchgears to be done.
- ACB release should give last 10 fault history.

Bus Coupler - It shall be similar to incomer switchgears and should be electrically and mechanically interlocked.

Protection - over load protection (phase wise) short circuit protection, reverse power over / under voltage & current, under / over frequency, earth fault protection with type of fault indication.

ELCB/ RCCB- It shall be 2 pole RCCB 16/25/40/63 A, electromagnetic type with 30 mA sensitivity with earth leakage trip indication complete as per specification with Metal enclosure It shall be Conforming to IS 12640-1/2000. It shall be erected in an approved manner as per site condition and instructions of field supervisor.

Residual Current Circuit Breakers: - The RCCB shall have conformance to IS 12640-1 / IEC 61008-1

- The RCCB shall be truly current operated and shall operate on Core Balance Current Transformer (CBCT) mechanism
- The RCCB shall have advanced neutral mechanism
- The RCCB shall have pollution degree 3
- The RCCB shall have minimum electric life of 10,000 electric operations
- The RCCB shall have terminal capacity of 35 sq. mm up to 63A, 50 sq. mm up to 100A
- The RCCB shall have IP20
- The RCCB shall have operating temperature -5 °C to +60 °C.
- The RCCB shall have a test button to check health of RCCB by creating artificial fault
- The RCCB shall have rated impulse withstand up to 6 kV
- The RCCB shall have no line load bias.
- The RCCB shall have bi-connect terminals for both bus bar and cable termination
- The RCCB shall give an indication for leakage fault when tripping
- The RCCB shall have rated conditional short circuit current of 10kA
- The RCCB shall have rated residual making and breaking capacity of 1kA
- The RCCB shall have flag indication for Earth Leakage Faults - The RCCB shall have a provision for padlock to prevent unauthorized access
- The RCCB shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release
- The RCCB shall be suitable for isolation
- The RCCB shall have safety shutter to avoid any wrong insertion of cable
- The RCCB shall have DIN clip on both the sides for easy removal of an RCCB from the DIN rail.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

ELECTRONIC KWH METER:- Electronic KWH meter, 3 phase, 4 wire, CT operated with unbalanced load and reverse protection for AC 415 Volt, 50 Hz supply This shall comply with Is 13779 Pt. I of 1972 and following features –

Instantaneous start, low power consumption, Meter shall record correct energy with same accuracy under reverse current connection. LED indication for current reversal tampering shall be provided. Phase available indication to be provided.

AMMETER- Digital type Ammeter 3 1/2 Digit LED display CT operated cap. as per panel requirement with necessary wiring and fixing accessories with selector switch.

VOLTMETER: Digital type Voltmeter 3 1/2 Digit LED display 0-750 volts with necessary wiring and fixing accessories with selector switch.

**Multifunction Meter –
Features**

- Accuracy Class 1.0, 0.5
- Input voltage measurement range 50-520 VAC
- Aux supply 80-300 VAC/DC
- CT secondary site selectable 1A / 5A
- Flush mounting 96 x 96 mm
- CT/PT site programmable
- V, A, F, PF, kW, kVA, Old energy, On and Run hours, site selectable kWh/ kVAh
- True PF or Displacement PF site selectable
- 3 line LED display
- With communication port RS485

Power Quality Analyzer –

- Bidirectional MFM with Datalog, LCD Display, RS485, 128 samples/cycle
- Class of accuracy : 0.5s
- Parameters : V, A, F, kW, KVA, kVA_r, kWh, kVA_h, kVA_r_h, PF(True & Displacement), Run hr, On hr, Interrupts, Phase angle, Total Harmonic Distortion, Neutral current, Max Demand (with RTC) K Factor
- Export / Import
- Events with high-low Time stamp
- Individual Harmonics upto 31st order

Variable Frequency Drive (VFD)

The VFD engineered to endure typical, extreme, and polluted environments while maintaining stable performance amid wide daily temperature fluctuations ranging from **10°C to 20°C**. It should demonstrates resistance to various chemical, mechanical (including sand, dust, vibration, and shock), and biological factors. Additionally, it should be capable of functioning effectively in harsh climatic conditions featuring humidity levels up to **100%**. The VFD should have no deration up to altitude of 1000 Meters

General Specifications(VFD)

The drive supports both heavy duty (HD) and normal duty (ND) overload capacities, rated at **150% for 60 seconds** and **110% for 60 seconds**, respectively. It is rated for HD operation up to **55°C** and ND operation up to **50°C**. Multiple control modes are available, including Voltage/Frequency (V/F), V/F Quadratic, and Vector Volts per Hertz Control (VVC). For communication, an integrated

Modbus RTU protocol facilitates easy connectivity. VFDs rated at **1.5 kW and above** include a built-in dynamic braking unit. Compliance with IEC60721-3-3 standards and CE certification is ensured when used with an external EMC filter. The PCB Component should be having conformal coating class 3S2 for dust & 3S3 for chemical pollution complying to IEC60721-3-3

Control (VFD)

The VFD should have V/F, U2/F, Sensor less vector control, slip compensation control methods. It should have nominal switching frequency of 4 KHz, & adjustable switching frequency from 2 – 12 KHz,

Input and Output Features (VFD)

The device should have multiple input and output options for flexible control and monitoring:

- Four Digital Inputs (DI)
- Two Digital Outputs (DO)
- One Analog Input (AI) and one Analog Output (AO) with selectable voltage/current functionality
- An optional remote LED keypad enhances operational flexibility

Ease of Installation, Use, and Maintenance (VFD)

Designed with a compact footprint suitable for enclosures, the VFD simplifies installation and maintenance. Power terminals are clearly identified to facilitate straightforward wiring. Operational status is displayed via a **4-digit LED display** with indicator text visible on both sides. A remote terminal cover includes wiring details for convenience. Safety is enhanced through lock arrangements on the Start, Stop, and Mode buttons. Programming should be user-friendly with a short menu list, complemented by a quick start guide and a comprehensive parameter list included in the package. Maintenance is expedited by an easily removable cooling fan. 3 Speed selection selector switch (Upto 60 %) should be provided

Protections Features (VFD)

The drive should be able to provide following protections

- Overcurrent
- Motor Short Circuit
- Under Load Protection
- 1 Output Loss
- 3 Ph Output Phase Loss – No Motor detection
- Over voltage
- Under Voltage
- Drive Overheat
- Input Phase Loss
- IGBT Overheat
- Process Overspeed
- AI 4-20 A current loss
- IGBT Short circuit
- Autotuning fault

Communication (VFD)

The drive should be having in built communication on RS 485 Modbus with transmission rate of 4800 – 38400 bps min.

Networking: (VFD)

1. Modbus connectivity shall be in-built with a speed of 115.2 kbps

Drive to PC connectivity: (VFD)

1. Drive to PC communication software shall be available for parameter backup activity.

Standards Compliance (VFD)

CE mark shall be based on the EMC guidelines and the Low Voltage Directive. VFD shall be tested according to European standards EN61800-3: 2004, and complies with the EMC guidelines

- Low Voltage Directive: 2006/95/EC
- EMC Guidelines: 2004/108/EC

VFD shall be tested according to European Standard IEC61800-501

VFD shall comply **RoHS** directive

Short Circuit Rating: (VFD)

VFD shall be suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes for 240 V in 200V class drives (up to 480 V for 400 V class drives) motor overload protection **with external SCPD device**

Support & Services (VFD)

Commissioning : The VFD supplier OR channel partner of VFD supplier shall undertake to assist the customer in commissioning the VFD. The VFD supplier shall provide suitably qualified staff to ensure successful commissioning.

Documentation : (VFD)

The VFD shall be provided with a complete set of user and support documentation, including,

- Technical manual
- Recommended list of spare parts
- Schematic drawings

Training: (VFD)

The VFD supplier shall be capable of providing a complete training schedule with the VFD. The VFD supplier shall undertake to deliver the complete training program if required by the customer. The training programme shall be delivered at the customer's premises, as required by the customer. The training programme shall deliver to the customer the skills to:

- appropriately program the VFD to meet customer requirements
- safely operate the VFD
- identify and rectify operating problems caused by incorrect programming
- identify and diagnose operating problems caused by faulty VFD

Warranty & Repair (VFD)

12 months from date of commissioning or 18 months from date of supply, whichever is earlier. The supplier shall guarantee to provide servicing support for a period of not less than 10 years.

INDICATING LAMPS :- LED type for outgoing and incoming supply separately.

GUARANTEE/ WARRANTEE :

The equipment shall give satisfactory service for 12 month from the date of commissioning or 18 months from the date of supply against all designs, manufacturing, workmanship and material defect. In case of failure of equipment's within 12 months. The contractor shall rectify /replace the defective parts/equipment's free of cost. In case of failure within 3 months from the date of commissioning. The tenderer shall replace the defective equipment's with accessories by new one free of cost.

However beyond 3 months the same will be repaired by the contractor as per the existing condition of the defective equipment's.

WIRING -The internal control wiring of panel shall be done by FRLS 2.5 sqmm copper wire as per IS 694 as per ratings of connected switchgear in an approved manner. The internal connections shall be easily accessible during inspection and maintenance of the panel board. Sufficient space shall be provided for cable entering hole and cable gland plate at the bottom.

CABLE ENTRY: Provision of suitable cable entry through brass glands to connect the equipment to incoming and outgoing cables shall be made. The cable entry to terminal of transformer shall be provided with suitable glands to avoid mechanical damage to the cable insulation. The cable shall be easily accessible.

Distribution board -Distribution board shall be made of high quality CRCA steel sheet with surface finish power coated mat finish broken white distribution board double door & neutral link with box type terminal tin plated Electrolyte grade copper bus bar & phase link tin plated brass earthing link and wire set for internal wiring DB shall be with IP 65 protection.

ERECTION- The panel board shall be installed on cement concrete foundation and cement mortar ratio of 1:2:4 or fabricated stand of Iron angle frame as per site condition & requirement. Height of cement concrete foundation / angle frame shall be 1 feet.(1/2 ft below ground level and ½ ft above ground level). Fabricated Iron angle frame shall be of 40mm x 40mm x 4 mm size angle. In Outdoor type panel board top sheet shall be provided such as to protect the panel board from entering the rainy water as per the instructions of field Engineer. Panel board shall be charged with existing power supply arrangement. The work shall be carried out under the supervision of field Engineer.

Successful tenderer shall submit the General Arrangement Drawing of panel board and get it approved before execution of the work at site.

22.Schedule item no. 39

Supply, erection, testing and commissioning of 300 W LED High Mast Flood Light for Tower as per specification.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of 300 W LED High Mast Flood Light with 31500 Lumens, CRI more than 80, THD≤10%, ATDH less than or equal to 10 percent, Power Factor more than 0.95, surge protection, IP 65, 91-120° angle, Power voltage 100-240 V 50-60 Hz, Operation temperature 0-50° C with toughened glass. LED colour temperature 5700 K, LED flood light fitting made of Matt black polyester powder coated pressure die cast aluminium housing. Matt black polyester powder coated pressure die cast aluminium frame with heat resistant toughened clear glass fixed with SS screw. LEDs are provided with secondary lens optics to get optimum optical performance. The driver used is specially designed to have built in surge voltage, open/short circuit protections. External surge protection provided for additional safety. Luminaire is provided with a MS mounting bracket fixed on pressure die cast aluminium housing for aiming adjustment complete with all other accessories and fixing arrangements i.e. GI pipe, GI bracket / clamp, stainless steel nut bolts etc. as per site requirements. The cost shall also cover supply & laying of 3Cx2.5 sq.mm Cu cable for the individual wiring of the luminaire. The technical parameter will generally be conforming to specification enclosed. Luminaire efficacy required minimum guaranteed **105 lumen/watt, IK-07, IP-66, Nominal Current (A)- 1.050**

23.Schedule item no. 37**SETC of 160 Watts LED Flood light fittings with high luminous efficiency, protected to IP65.**

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of 160/150W industrial LED Flood light fitting, Powder coated die-cast aluminum housing & driver compartment. LEDs are fixed in above aluminum PDC housing for proper thermal management. Isolated (Potted) driver with constant voltage & constant current type. With high voltage, short circuit, open load & short circuit, High efficiency, Optimized uniformity, Lens without holder provided. Also provision for bracket mounting for aiming purpose. Completely pre-wired with accessories up to terminal block. Luminaire efficacy required minimum guaranteed **110 Lumen /watt** at luminaries level; LM 79 and 80 to be provided along with tender. CCT 6500, CRI \geq 70, Beam Angle 60 degree, Operating Temperature range -10°C to 50 °C, PF > 0.95, THD < 15 %, Built in Surge protection of 5 KV internal & 10 KV external. IP: 66

24.Schedule item no. 40**SITC of 22-30W LED pit light 24V AC 50 Hz. with IP67/IP68 protection integral luminaries, compact, robe, ORHS compliance, available in white color.**

The contractor shall have to do supply, installation, testing and commissioning of 22-30W Watt, 24V AC 50 Hz LED pit light fitting IP67/IP68 protection integral luminaries, compact, robe, ORHS compliance, available in white colour with high durability diffuser complete with constant current driver & all associated accessories. Design and sample based on the design shall be got approved by Sr.DEE(G)BSL before erection. The contractor should submit the copy of challan or bill for the above LED light fittings from the manufacturer/authorized dealer issued on the name of contractor. This includes design, fabrication, supply, installation, testing and commissioning of LED based pit lighting including power supply units and complete in all respect.

1. Input Voltage- 24 V AC
2. Input Power- 22-30 Watts
3. Protection - IP67/IP68
4. Orientation - Movable
5. Warranty- 05 Years

The fitting shall be installing in such a way that it covers entire Pit line length in equal distance. Fitting shall be installed in existing pocket of the Pit line by required civil work.

SPECIFICATION OF LED LUMINAIRES**Ref: RDSO Doc. No. RDSO/EM/ LED Norm/ 01, Ver: 1.0 Date: 18.09.2014****Technical requirements of LED**

S.No.	Description	Specification
1	LED Make	Nichia, Osram, Seoul, Philips, Lumileds, Cree and Lednium
2	LED Type	High Power, SMD (Surface Mounting Device) LED
3	Lumen Out Put / Efficacy at luminaries Level	I. >125 lumen/Watt for Indoor Light fittings. II.>100 Lumen/Watt for Street Light up to 45 watt &>110 lumen/Watt above 45 Watt. III. >110 Lumen/Watt for Flood Light up to 100 Watt &>120 lumen/Watt above 100 Watt. IV. >120 lumen/Watt for Highbay Fittings up to 100 Watt &> 140 Lumen/Watt above 100 Watt.

4	LED Life	> 50,000 Burning Hours.
5	Depreciation	30% max. after 50,000 Burning Hours.
6	Nominal Voltage	220 V, 50 Hz AC
7	Input Operation Voltage	90-300 Volts AC
8	Control of Distribution	Fully cut Off
9	Driver Type	Constant Current Driver with short circuit Protection.
10	Driver Component	Industrial Grade only
11	THD	< 10 %
12	Efficiency of Driver	> 90 %
13	Driver Surge Protection	10 KV
14	Color Temperature	5665 \pm 355 K
15	Color Rendering Index	\geq 65
16	Power Factor	> 0.95
17	Construction of Housing	Extruded Aluminum /CRCA/ Die Cast Aluminum
18	Finishing	Powder coated / anodized
19	Lamp cover	Poly Carbonate / Toughened glass
20	Secondary Optics	Poly carbonate reflector / Poly carbonate lens
21	Mounting	Suitable for surface /recessed /Pole (as per requirement)
22	Ingress Protection	For Indoor :- IP20 & for Out Door :- IP 65
23	Temperature Rise	Soldering point temperature of the LEDs must be equal to or less than 85 ⁰ C. Temperature rise (above ambient) of heat sink should generally remain within 20 ⁰ C.
24	Report to be submitted	LM 79, duly certified by NABL accredited Lab- for LED Luminaire Performance. LM 80, duly certified by accredited Lab of the host country for LED Chip Performance.

25.Schedule item no. 41

Supply, erection, testing and commissioning of astronomical street light control panel outdoor type CRCA sheet steel powder coated capacity- 6 kW single phase consisting digital 24 Hr timer,32 A TP contactor, 40 A SPN (DP) MCB, auto/manual switch with complete wiring suitable to be mounted on channel/angle fixed on electrical pole IP-32

Supply, erection, testing and commissioning of Astronomical Street Light timers for automatic controlling of street lighting with 100Amp contactor power, AC-1 rating 440V, 50Hz conforming to IS 60947-4-1.

GENERIC ATSC is an intelligent Street light control timer that can be used to control several existing street light.

Technical specification for Street Light Timer

1	Operating Voltage	240VAC
2	Rated Frequency	50 Hz
3	Installation Type	DIN Rail
4	Type of Contact	Changeover Contact
5	Program Functions	ON/OFF
6	Number of Programming	8 ON/8 OFF (or) better
7	Power Reserve	48 Hrs (or) better
8	Switching Capacity at 250 VAC, cos =1	43A

9	Switching Capacity at 250 VAC, cos=0.6	24A
10	Shortest Switching Time	< 1 Min
11	Mechanical Life	10 ⁷ or more
12	Electrical Life	10 ⁵ or more
13	Time Accuracy	< 2 s/day
14	Power Consumption	< 4 VA
15	Degree of Protection	IP 65
16	Ambient Temperature	10°C to + 40° C
17	Over voltage protection	260 V ± 5V
18	Under voltage protection per phase	160 V ± 5V
19	Over load minimum 10% of rated load	protection per phase
20	Programmable time switch	Programmable time switch shall automatically adjust the ON/OFF set time along with seasonal variations like sun rise and sun set as per the geographical area

26.Schedule item no. 30 to 32

Supplying, fixing and commissioning 4 pole RCBO up to 16A, with overcurrent, rated short-circuit breaking capacity (10 kA) and earth leakage protection, with 30 mA sensitivity and short circuit and earth leakage trip indications per specification

Supplying, fixing and commissioning 4 pole RCBO 32/40A, with overcurrent, rated short-circuit breaking capacity (10 kA) and earth leakage protection, with 30 mA sensitivity and short circuit and earth leakage trip indication as per specification

Supplying, fixing and commissioning 2 pole RCBO up to 16 A, with overcurrent, rated short-circuit breaking capacity (10 kA) and earth leakage protection, with 30 mA sensitivity and short circuit and earth leakage trip indication as per specification with metal enclosure.

Specification for RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

27.Schedule item no. 21

Supply & erection of FRP junction box of suitable size having terminals and 1x16 A Cut out with Two Nos of entry glands.

Supply & erection of FRP junction box of suitable size having terminals and 1x16 A Cut out with Two Nos of entry glands.

The junction box should be water tight made of FRP of size 300 x 200 x 125 mm, 2.7 mm thick with electrically insulated body shock proof, connector leads and control equipped with 1 nos.16 amps cutout and rewirable fuse. The box should be of front door opening with rubber gasket to make it water tight. The junction box shall be vermin proof having rubber bushes at cable entry. The junction box shall be mounted on pole/ wall etc at the height of 1.50 mtrs or as per site condition by providing MS clamps of suitable size. Colour of junction box shall be got approved before erection. The junction box shall be erected in an approved manner as per the site condition and instructions of field Engineer.

28.Schedule item no. 42

Supply, erection, testing & commissioning of Lighting circuit board double door powder coated with locking arrangement consisting of 1 Nos x 63 A 4P RCBO as incoming and 8 Nos x upto 25 A 2 P RCBO, 10 Nos x upto 16 A 2 P RCBO for outgoing complete.

The price shall cover cost of supply, loading, transportation and unloading of material at site, erection testing and commissioning of single phase/ 3 phase distribution board as above. The DB shall be double metallic door type with earthing terminal, bus bars, neutral link, etc. housed in 16 SWG CRCA sheet enclosure powder coated type with all accessories with IP 65 **protection**. The minimum breaking capacity of MCB shall be 10 KA.

MCB DB- MCB Distribution board consisting with various capacity of MCB's as in schedule. MCB shall be 'C' Class, of 10 kA breaking capacity and conforming to IS 8828 –78 with latest amendments. MCB shall be with ON/OFF indication, IP 65-degree protection, showing mid trip position in case of overload or short circuit conditions. MCB shall be having bi-connect terminals, load-line reversibility and with energy limitation class –III features.

Distribution board shall be made of high quality CRCA steel sheet with surface finish powder coated mat finish broken white distribution board double door & neutral link with box type terminal tin plated Electrolyte grade copper bus bar & phase link tin plated brass earthing link and wire set for internal wiring. DB shall be with IP 65 protection. It shall be provided with cements skill protection and side locking DIN bar interchangeable door.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

Features –

- Communication ready
- Add on Auxiliary
- 100% recyclable
- Inscription Window - Ensures circuit identification and hence reduces maintenance downtime.
- Large Cable Terminals - The terminals are Suitable for cables upto 35 mm² cross section area. Thus making it suitable for copper and aluminium cables.
- Safety Terminals - They guide the cable towards the cage terminal and avoid improper cable termination.
- Bi Stable Clip - Every device is provided with a dual position DIN rail clip, so it becomes much easier to change a device from a device bank connected to a bus-bar, without disturbing the existing wiring.
- Dual Termination - Two types of busbar can be used, that is, Fork Type and Pin Type
- Test Button - Test button for regular inspection/testing

Technical Specification		AFDD with RCBO
1	Standard Compliance	IEC 62606 & IEC/EN 60898-1 & IEC 61009-1
2	No of Poles	1P+N
3	Module Type	4 Module
4	Rated Current In (A)	16 A, 32 A & 40
5	Rated Residual Operating Current (I Δ n)	30 mA, 100 mA
6	Operating Characteristics in case of residual currents	A Type
7	Rated Voltage U _e (V)	230 V ac
8	Insulation voltage U _i (V)	500 V ac
9	Min Threshold for protection against overvoltage (V)	270 V \pm 5%
10	Rated Frequency (Hz)	50 Hz
11	Rated Breaking Capacity	10 kA
12	Ambient Temperature (°C)	-5 °C to 40 °C
13	Storage Temperature (°C)	-20 °C to 60 °C
14	Terminal Supply Side	Bottom/Top
15	Mounting Type	Clip on DIN Rail (35 mm x 7.5 mm)
16	Electrical Endurance	4000
17	Mechanical Endurance	10000

18	Tightening Torque	2 Nm (Bottom) / 1.2 Nm (Top)
19	Ingress Protection	IP 20
20	Max Power Loss	5 W
21	Conductor Cross-Section (Solid & Stranded)	0.75 mm ² - 16 mm ² (Top) 0.75 mm ² - 35 mm ² (Bottom)
22	Tripping Characteristic Curve	C Curve
23	Energy Limit Class	3
24	Indications	LED Indication (ON-Red, OFF-blank)

29.Schedule item no 29

Dismantling the existing light poles with infrastructure and handing over to depot incharge at their depot.

The work involves the dismantling the existing light poles/pipes with infrastructure and brackets, clamps, insulators, stay from the cement concrete foundation and making the site clear by refilling the pits with excavated materials and bringing it to the ground level. Also with accessories. The dismantled Pole/Material shall be deposited in concern SSE(M) Depot with necessary transportation for shifting of material.

30.Schedule item no. 34

Supply, erection, testing & commissioning of Double walled corrugated (DWC) pipes 103.5 MM inner dia & 120 MM outer dia confirming to IS specification No. IS.14930- (Part 2) 2001 with one coupler for every 6 meter length of pipe.

The price shall cover supply, erection, testing and commissioning of Double walled corrugated (DWC) pipes 103.5 mm inner dia & 120 mm outer dia confirming to IS specification No. IS.14930- (Part 2) 2001 with one coupler for every 6 meter length of pipe.

31.Schedule item no. 43

Supply, erection, testing & commissioning of LT Mini feeder pillar

The price shall cover cost of supply, erection, testing and commissioning of outdoor type Mini feeder pillar board for 100 KVA transformer with associated accessories as per requirement at site consisting of 1 no. 100 amps MCCB (Microprocessor based with earth leakage protection) and 4 sets of fuse base of 100 amps (12 nos.) and HRC fuse of 63 amps capacity on outgoing side. Enclosure should be fabricated with 16 SWG CRCA sheet and duly powder coated. The feeder pillar should be erected on MS angular frame with brick masonry work etc. complete in all respect confirming to relevant IS.

32.Schedule item no. 28

shifting of Pole of suitable size and re-erection of the pole with foundation & complete accessories etc.

The price covers all the work shall include removal of existing pole of suitable size and re-erection of the pole with foundation & complete accessories etc along with transportation, modification for reduction in length if required, providing foundation, re-erectionat proposed location as per site engineer. The work shall be done in approved manner as per the instructions of field Engineer. All luminaries and other accessories from existing pole should be removed before dismantling.

Dismantling should be done with the help of the crane so that there should be no any damage to equipment. Wire rope/motor should be removed and then dismantling of high mast to be carried out.

Necessary transportation for shifting of high mast to be done by contractor at his own cost. Foundation for new location should be done as per standard & wind speed 50 m/sec.

GENERAL CONDITIONS FOR SUPPLY AND ERECTION

1. The work is to be done as per tender technical specification. In case of any doubt etc. the details as given in tender technical specifications will prevail.
2. All the supply and erection work shall be done in accordance with relevant IS.
3. Contractor shall supply the material duly inspected by Railway representative or agency as per inspection clause mentioned below.
4. Any kind of testing required to confirm suitability of material either at manufacturers premises or at Rly. Stores before material is accepted by consignee shall be the responsibility of contractor. All testing charges shall be borne by the contractor.
5. Due care has been taken while framing technical specification, however if any deviation from prevailing standard norms is noticed at the time of execution the same shall be rectified and made good by the contractor. Contractor shall also bring such things if ever noticed by them to the knowledge of this office and to field Engineer.
6. Site survey shall be carried out by the contractor and Rly. Representative on award of LOA and before starting the work. Targeted Action Plan with material delivery schedule based on above survey shall be prepared by the contractor. One copy of the same shall be submitted to Engineer for monitoring the progress.
7. All material to be used for work shall be duly supported with test/inspection reports shall be deposited with SSE in charge of execution for ensuing quality before fitment. Only after clearance and satisfaction of quality the material shall be taken to site for erection and commissioning. Contractor shall therefore supply material in bulk lots to avoid repetitions of inspections/ testing.
8. **INSPECTION and TESTING:-**
 - (i) The stores material shall be inspected by Railway Representative nominated by Sr.DEE (G) BSL. All the inspection and testing charges shall be borne by the contractor. The contractor shall submit details of the material being offered before inspection schedule date at manufactures premises/ consignee premises. Where RITES or any third party is nominated as inspection agency, the inspection fee charged to the agency shall be borne by Contractor.
 - (ii) Material having value above Rs.5 lakhs shall be inspected by RITES. Inspection of other materials shall be done by Railway's representative.
9. **Successful bidder/tenderer shall survey the site and submit action plan within 15 days immediately after issuing of LOA to this office.**
10. All released material to be deposited to concern field In-charge office/depot.
11. There may be minor variation in rating / other parameters from make to make. The variation in positive side and beneficial to Railway is acceptable. However, prior approval of Sr.DEE(G)BSL shall be required before delivery of material to Railways.
12. In case, any contradiction in schedule of rate and specification; final decision of Railway authority will be final as per railway requirement.
13. LED fittings shall be guaranteed for 5 years

CHAPTER –IV

SCHEDULE OF QUANTITIES

AND

RATES

CENTRAL RAILWAY**ELECT (G) BRANCH****BHUSAWAL DIVISION****TENDER No. BSL-L-W-T-49-2026**

Schedule of work, rates and quantities for the work of Electrification work in connection with provision of pathway in Bhusawal, Badnera, Nandgaon, and Khandwa yard.

S N	Description	QTY.	Unit	Sup. Rate	Erec. Rate	Total cost of sup.	Total cost of erec.	Grand Total
1	Supply, erection, testing & commissioning of 20 Mtrs. GI Stadium Mast as per Dimension: Top Dia.-150 mm, Bottom Dia. - 480 mm, Section- 2 (Section Length - 10300 mm.) Thick- T1- 4 /T2-5 mm.Base Plate - 670 X 32 mm.PCD: 590; stadium Mast suitable to with stand wind speed 50 m/s with 11 nos LED FLOOD LIGHT Mounted in Asymmetrical arrangement, With Foundation Bolts : M30 X 850 X 12Sets., 32 Amp Feeder Pillar, Platform and Ring for housing LED Luminaires, Counterweightarrangement with fixing studs, Motorized accessories with winch,trailing cable,wire rope, SD LED AOL. (BD=2, KNW=2, NGN=2, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)	6	Nos	532651	0	3195906	0	3195906
2	Supply, erection, testing and commissioning of 16 meters high mast system with accessories mast shall be in two sections, hot deep galvanized and suitable for wind velocity as per IS 875, erection complete with guarding ploes. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=5, SSE/EM/South/BSL=0)	5	Nos	232338	21018	1161690	105090	1266780
3	SETC of 20 Mtr. High Mast lighting tower with foundation along with 9x350 watt LED fittings complete with all accessories. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=4)	4	Nos	468091	37835	1872364	151340	2023704
4	Fabrication, supply and erection of Fencing around the high mast in square shape size 2M x 2M and height 1.5M from ground level fabricated from MS angle size40x40x6mm, MS Flat size 40x6mm and wire mesh made of 8SWG wire and 1M wide hinged	15	Nos	8737	0	131055	0	131055

	type lockable door as per drawing approved by Railway including grouting, CC platform around the high mast above 0.30M above ground level and painting etc. complete as per site requirement. (BD=2, KNW=2, NGN=2, SSE/EM/NRSS/BSL=5, SSE/EM/South/BSL=4)							
5	Supply, erection, testing & commissioning of maintenance free earth as per RDSO specification no. RDSO/PE/SPEC/ PS/0109-008 (REV '0') with improved earthing enhancing compound and exothermic welding (BD=4, KNW=10, NGN=20, SSE/EM/NRSS/BSL=20, SSE/EM/South/BSL=15)	69	No	13144	2075	906936	143175	1050111
6	Supply, fabrication, laying welding and connection of GI Flat of size 25x3 mm from earth pit with GI nut Bolt suitable size. (BD=200, KNW=100, NGN=100, SSE/EM/NRSS/BSL=200, SSE/EM/South/BSL=200)	800	kg	87	27	69600	21600	91200
7	Supply of 4 core 16 sqmm armoured XLPE Cable. (BD=0, KNW=500, NGN=500, SSE/EM/NRSS/BSL=100, SSE/EM/South/BSL=0)	1100	Mtrs.	187	0	205700	0	205700
8	Supply of 4 core 25 sqmm armoured XLPE Cable. (BD=1000, KNW=300, NGN=100, SSE/EM/NRSS/BSL=1000, SSE/EM/South/BSL=500)	2900	Mtrs.	244	0	707600	0	707600
9	Supply of LT XLPE Armoured 4 Core 50 Sqmm Aluminium cable as per relevant IS. (BD=0, KNW=0, NGN=100, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=500)	600	Mtrs.	451	0	270600	0	270600
10	Supply of 4 Core 70 Sqmm armoured LT XLPE Cable. (BD=0, KNW=100, NGN=100, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=500)	700	Mtrs.	519	0	363300	0	363300
11	Trenching & refilling of LT/HT/ Various sizes of PVC / XLPE cables- Along the Road (Size - 900mm x 300mm) (BD=600, KNW=400, NGN=400, SSE/EM/NRSS/BSL=700, SSE/EM/South/BSL=800)	2900	Mtr.	0	231	0	669900	669900
12	Digging of cable trench 300/450 mm x 1000 mm in RCC/PCC/hard	1200	Mtr.	0	401	0	481200	481200

	soil & refilling as per specification and requirement at the site. (BD=200, KNW=300, NGN=300, SSE/EM/NRSS/BSL=200, SSE/EM/South/BSL=200)							
13	Transportation, Laying, Installation, terminating, testing and commissioning of LT/HT cable of sizes 10 sqmm to 400 sqmm in existing trench, pipe or on structure. (BD=800, KNW=700, NGN=700, SSE/EM/NRSS/BSL=900, SSE/EM/South/BSL=1000)	4100	Mtr.	0	31	0	127100	127100
14	Erection, testing and commissioning of cables other than trench i.e. Wall/Truss including clamp, GI wire and hardware (BD=200, KNW=200, NGN=100, SSE/EM/NRSS/BSL=200, SSE/EM/South/BSL=500)	1200	Mtr.	0	72	0	86400	86400
15	Supply & laying of GI pipe Class B, ISI marked under road /Clamping with erecting pole or wall as per technical specification & drawing for passing cable. (BD=50, KNW=70, NGN=15, SSE/EM/NRSS/BSL=90, SSE/EM/South/BSL=30)	255	Mtr.	202	0	51510	0	51510
16	Supply, installation, testing & commissioning of HDPE Pipe 110 mm Nominal Dia as per IS-4984-1995. (BD=50, KNW=80, NGN=50, SSE/EM/NRSS/BSL=50, SSE/EM/South/BSL=50)	280	Mtr.	500	0	140000	0	140000
17	Supply and laying of RCC half round pipe 150 mm ID & 1 mtr length. (BD=700, KNW=600, NGN=300, SSE/EM/NRSS/BSL=200, SSE/EM/South/BSL=900)	2700	Nos.	94	14	253800	37800	291600
18	Supply and laying of RCC Hume Pipe of size 6"(150mm) dia 2 mtr. Length. (BD=2, KNW=5, NGN=5, SSE/EM/NRSS/BSL=5, SSE/EM/South/BSL=25)	42	Nos.	656	99	27552	4158	31710
19	Supply, erection of RCC Type cable route marker with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10cm including inscription duly	40	Nos	449	0	17960	0	17960

	engraved as required. (BD=10, KNW=10, NGN=20, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)							
20	Supply & Erection of RCC Warning Cover and refilling the cable trench in an approved manner. (BD=10, KNW=10, NGN=20, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)	40	Nos	327	146	13080	5840	18920
21	Supply & erection of FRP junction box of suitable size having terminals and 1x16 A Cut out with Two Nos of entry glands. (BD=0, KNW=2, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=20)	22	Nos	732	122	16104	2684	18788
22	Supply & erection of 3 core x 2.5 Sqmm armoured copper Cable. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=100)	100	Mtrs.	150	14	15000	1400	16400
23	Supply, fabrication, fixing and erection of MS Work of miscellaneous size and for cable tray etc. including painting complete. (BD=100, KNW=100, NGN=100, SSE/EM/NRSS/BSL=20, SSE/EM/South/BSL=100)	420	Kg	91	16	38220	6720	44940
24	Supply of all material,excavation and casting of cement concrete foundation/concreting in ratio 1:3:6 for above work. (BD=4, KNW=1, NGN=5, SSE/EM/NRSS/BSL=5, SSE/EM/South/BSL=5)	20	cum	6128	0	122560	0	122560
25	SETC of LT Outdoor type panel as per IEC 61439 with double door powder coated withlocking arrangements consisting of 1 Nos x 200 A 4P MCCB, 4 Nos x 63 A 4P MCCB With ELR & CBCT for each MCCB, multifunctionmeter, indication lamp, copper busbar, & other associate aceesories. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter) (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=1)	1	Nos	502088	1333	502088	1333	503421

26	SETC of LT Outdoor type panel as per IEC 61439 with double door powder coated with locking arrangements consisting of 1 Nos x 125 A 4P MCCB as I/C and 4 Nos x 63 A 4P MCCB With ELR & CBCT for each MCCB, multifunction meter, indication lamp, copper busbar, & other associate accessories. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter) (BD=0, KNW=1, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)	1	Nos	428768	10142	428768	10142	438910
27	Providing & erecting Hot dipped Galvanised Perforated type cable tray manufactured from 16 SWG (1.6 mm thick) GI sheet of 300 mm width & 100 mm height comprising all required standard accessories. (BD=0, KNW=0, NGN=50, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)	50	Mtr	948	118	47400	5900	53300
28	shifting of Pole of suitable size and re-erection of the pole with foundation & complete accessories etc. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=20, SSE/EM/South/BSL=0)	20	No	0	2000	0	40000	40000
29	Dismantling of existing Light poles with infrastructure and handing over to depot incharge at their depot. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=20, SSE/EM/South/BSL=0)	20	Nos	0	1351	0	27020	27020
30	Supplying, fixing and commissioning 4 pole RCBO up to 16A, with overcurrent, rated short-circuit breaking capacity (10 kA) and earth leakage protection, with 30 mA sensitivity and short circuit and earth leakage trip indications per specification (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=10, SSE/EM/South/BSL=0)	10	Nos	4776	0	47760	0	47760
31	Supplying, fixing and commissioning 4 pole RCBO 32/40A with overcurrent, rated	26	Nos	4952	0	128752	0	128752

	short-circuit breaking capacity (10 kA) and earth leakage protection, with 30 mA sensitivity and short circuit and earth leakage trip indication as per specification (BD=0, KNW=0, NGN=1, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=25)							
32	Supplying, fixing and commissioning 2 pole RCBO up to 16 A, with overcurrent, rated short-circuit breaking capacity (10 kA) and earth leakage protection, with 30 mA sensitivity and short circuit and earth leakage trip indication as per specification with metal enclosure. (BD=0, KNW=0, NGN=1, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=10)	11	Nos	3737	0	41107	0	41107
33	Supply, installation, testing & commissioning of single phase RCBO of 32A capacity, 30mA sensitivity with Metal enclosure. (BD=0, KNW=0, NGN=1, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)	1	Nos	3480	0	3480	0	3480
34	Supply, erection, testing & commissioning of Double walled corrugated (DWC) pipes 103.5 MM inner dia & 120 MM outer dia conforming to IS specification No. IS.14930- (Part 2) 2001 with one coupler for every 6 meter length of pipe. (BD=0, KNW=0, NGN=200, SSE/EM/NRSS/BSL=500, SSE/EM/South/BSL=0)	700	Meter	127	13	88900	9100	98000
35	Supply, erection, testing & commissioning of 7 Mtr high (clear height) galvanised octagonal pole with foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation. (Along with 2 pole RCBO 6A, with 30 mA sensitivity & single/Double arm with wiring arrangements). (BD=0, KNW=0, NGN=10, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=10)	20	Nos	14228	1046	284560	20920	305480
36	Supply, fixing, testing & commissioning of LED street light lumaires 48W maximum, whether proofhaving IP 65/66 protection, having inbuilt auto dimming driver and sensor, System efficacy	16	Nos	3129	0	50064	0	50064

	100lm/W, Luminaires must be capable of delivering minimum 4800 lumens, luminaries complete with all accessories. (BD=6, KNW=0, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)							
37	SETC of 160 Watts LED Flood light fittings with high luminous efficiency, protected to IP65. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=10)	10	Nos	13168	54	131680	540	132220
38	SETC of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP66 protection, Wattage 70 ±2 watts, input voltage-240 volts ac, 50Hz. Complete with PIR sensor based with IR sensor. (BD=0, KNW=0, NGN=10, SSE/EM/NRSS/BSL=10, SSE/EM/South/BSL=20)	40	Nos	7906	70	316240	2800	319040
39	Supply, erection, testing and commissioning of 300 W LED High Mast Flood Light for Tower as per specification. (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=45, SSE/EM/South/BSL=0)	45	Nos	9437	475	424665	21375	446040
40	SITC of 22-30W LED pit light 24V AC 50 Hz. with IP67/IP68 protection integral luminaries, compact, robe, ORHS compliance, available in white color, Make-Jaquar, Halonix, Surya, Ultraone. (BD=0, KNW=2, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)	2	Nos	3901	0	7802	0	7802
41	Supply, erection, testing and commissioning of Astronomical street light control panel outdoor type CRCA sheet steel powder coated capacity- 6 kW single phase consisting digital 24 Hr timer, 32 A TP contactor, 40 A SPN (DP) MCB, auto/manual switch with complete wiring suitable to be mounted on channel/angle fixed on electrical pole IP-32 (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=1, SSE/EM/South/BSL=0)	1	Nos	11026	767	11026	767	11793
42	Supply, erection, testing & commissioning of Lighting circuit	1	Nos	118450	1333	118450	1333	119783

	board double door powder coated with locking arrangement consisting of 1 Nos x 63 A 4P RCBO as incoming and 8 Nos x upto 25 A 2 P RCBO, 10 Nos x upto 16 A 2 P RCBO for outgoing complete. (BD=0, KNW=0, NGN=1, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=0)							
43	Supply, erection, testing & commissioning of LT Mini feeder pillar (BD=0, KNW=0, NGN=0, SSE/EM/NRSS/BSL=0, SSE/EM/South/BSL=1)	1	Nos	16369	2456	16369	2456	18825
	Grand Total							14217741

S= Supply, E= Erection/laying, T= Testing, & C= Commissioning, Nos.= numbers, D-Dismantling.

1) The tender schedule shall be read in conjunction with scope of work and technical specification of the work for various items included therein

2) Tenderer / should Quote his / their own single & common percentage rates in offer sheet i.e. above /At Par / below the estimated rates of Railways schedule.

3) I/We agreed to execute the above work at -----% (In figure) -----
(in words) above /At Par / below of the Railways schedule of rates.

NOTE:-

(i) The above rates are inclusive all taxes and duties including GST.

(ii) The tenderer shall quote the all-inclusive rates i.e. Labour, Material, tools / repair maintenance including **GST and income tax** etc. No additional payment shall be paid by railway other than accepted offer.

Signature

Address and seal of Contractor

Sr DEE(G)Bhusawal

The List of Makes to be used in works.

Annexure-I

SN	Item description	Accepted Makes
1	Switch, Socket, industrial socket, Batton/Angle holder Ceiling rose, SDB	Lauritz Knudsen (L&T), Havells, Legrand, Cona, Crabtree, C&S, Press Fit, Anchor, Benlo
2	Time Switches / Astronomical timer	Lauritz Knudsen (L&T), Siemens, Legrand, Havells, GE
3	DP Switch	Lauritz Knudsen (L&T), Havells, Legrand Siemens, GE, ABB, Cona, Crabtree, HPL
4	MCB /RCCB/RCBO/PRCD	Havells, Lauritz Knudsen (L&T), Legrand, Siemens, ABB, Schneider, Benlo
5	SFU /ACB / VCB / MCCB / ATS	Lauritz Knudsen (L&T), Siemens, Legrand, ABB, Schneider, Hager, Havells, Benlo
6	FRMUE/ EFS/ RMU/ Indoor compact switchgear / VCB Panel	ABB, L&T, Schneider, GE, Siemens
7	Switchgear for AMF/APFC panel	Lauritz Knudsen (L&T), Legrand, GE, Siemens, ABB, Hager, Schneider, Havells.
8	Thyrister, Contactors, Reactors	Lauritz Knudsen (L&T), Legrand, GE, Siemens, ABB, Hager, Schneider, Havells.
9	LT Panels (IEC 61439)	Siemens, ABB, Schneider, Lauritz Knudsen (L&T), Havells, Legrand
10	Ray roll plug socket	Legrand, Anchor, GE, Havells and Standard
11	Luminaries fittings/ Facade lighting	Philips, Havells, Jaquar, Wipro, Bajaj, Panasonic, Surya, Orient, Crompton
12	Sensor based Luminaries fittings	Philips, GE, Havells, Wipro, Bajaj, Tata Power.
13	PIR sensors	L&T, Philips, Legrand, Crompton, Havells, Jaquar, Wipro, Bajaj, Orient, Atomberg
14	LED	NICHIA / CREE / OSRAM / SEOUL / PHILIPS /LUMILEDS / Samsung
15	LED Pit Light	Philips, GE, Havells, Syska, Jaquar, Wipro, LED 4 India, Shakti.
16	LED indicators for panel.	Lauritz Knudsen (L&T), Siemens, ABB, Schneider.
17	Solar Standalone street light	Philips, Havells, Exide, Surya, Bajaj, Wipro, Jain Irrigation
18	Torch Light (1.5 -3 Kms range)	Nei, Ascentech, kinnav, Havells, Eveready, GE, Jaquar, Wipro, Yashika
19	High Masts, Flag mast, Poles	Bajaj, Utkarsh, Valmont, Havells, Wipro
20	FRP cable looping boxes	Sintex, Ercon, Bravo, National
21	Junction Boxes	Hensel, Cape Electric, National, Sintex.
22	Cable- HT, UG/Aerial Bunched Cable	Havells, Polycab, RR Kabel, KEI, Finolex
23	Cable/wire- LT, PVC/XLPE, UG/ Aerial Bunched Cable/ flexible, armoured/ unarmoured, domestic cables/wires.	Havells, Polycab, RR Kabel, KEI, Finolex, Vishal
24	Cable/Bus Duct, Bus trunking	Schneider Electric India Ltd. Legrand, Lauritz Knudsen (L&T), ABB, EAE
25	Cable joint and termination kit	M-seal, Dowells, Kaycee, Jainson, Cabseal, 3M, Mahindra & Mahindra.
26	BLDC Ceiling Fan / Pedestal fan / Exhaust Fan, Electronic Fan Regulator	Havells, Orient, Usha, Atomberg, Crompton, Bajaj
27	Wall Bracket fan/Air Circulator	Bajaj, Havells, Usha, Crompton, Orient, Almonard.
28	Casing Capping / PVC conduit	Prestoplast, Precision, Modi, Press Fit
29	Multi-Function meter & Electrical measuring instruments	Lauritz Knudsen (L&T), Siemens, Secure, ABB, Schneider, Set & De, trinity, MECO
30	Megger, Anemometer, Digital Multifunction (Loop Impedance Meter) Tester	Megger, Fluke, Stanlay
31	Earth tester	Meco, Nippen, Stanlay
32	Digital Clamp on Meter (Tong Tester).	Meco, Stanlay, Fluke
33	BDV Testing Kit	Stanley, Motwane
34	Digital lux meter	Fluke / Stanley / meco /Rishabh
35	Digital clamp on earth tester	Motwane, kusum-meco, Megger, Fluke, Stanlay
36	Digital Vernier caliper, Digital screw gauge	Baker, Freemans, Insize, MITUTOYO, TESA
37	Cable Fault Locator	Megger, Stanlay, Kusum-meco, Radiodetection, Fluke
38	Surge Suppressor	Legrand, Rider, Costain, Havells, Schneider, ABB, GE
39	Pumps (Make of Motor for Pump shall be acceptable as per OEM of the Pump)	Kirloskar, Crompton, KSB Pumps, Deccan, Jyoti, Wilo, Flowmore, Goodwin. Mather Platt, CRI, Worthington.
40	Pump Guard	Minilec, Lauritz Knudsen (L&T), Crompton, Siemens, C&S
41	Motor Starter	Lauritz Knudsen (L&T), Kirloskar, Schneider, GE, Siemens, CG, BCH, C&S
42	VFD Drive / Soft Starter	ABB, Siemens, Lauritz Knudsen (L&T), Schneider.
43	Valves all types & Butterfly	C&R / Audco / Castel / Leader / Honeywell / Kirloskar
44	GI Pipes	Tata, Zenith, Jindal, Bansal, Surya Prakash, Swastik, Apollo
45	PVC Pipe/ Column Pipe	Finolex, Supreme, Astral, Ashirvad, Prince, Apollo
46	HDPE Pipe	Supreme, Utkarsh, Jain Pipes, CRI Pipes
47	Polyolefin Cable channel	Finolex, Supreme, Astral, Ashirvad, Prince, Apollo
48	M.S. Pipes	Jindal / Tata / Zenith / GST / Malhotra
49	TMC Pipe	IT Combo, Palak, Sagar, Mahavir
50	UPS Battery	AMARARAJA, EXIDE, CBS, PANASONIC, HITACHI, HBL, OKAYA
51	UPS/ Inverter	Numeric Power Systems Ltd, APC, Schneider, Legrand, Emerson (Siemens), Luminous Power Technologies Pvt. Ltd. Luminous, Su-Kam, Microtek, Uniline
52	Standard Lead Acid Battery	Amararaja, Exide, Okaya, HBL

53	Geysers, Water Heater	Bajaj, Havells, Crompton Greaves, Jaquar, Racold, Morphy Richards
54	Flex for Glow Sign Board	LG 3m penaflex
55	Vinyl for Glow Sign Board	LG 3m penaflex
56	Cement	Ultratech, ACC, Ambuja, JK, Birla
57	Paints	Asian, Nerolac, Dulux, Shalimar, Berger
58	Sleeve Insulation	The Supreme Industries Ltd. / K Flex / Armaflex / A Flex
59	GI sheet	Jindal / Sail / Essar / Tata / Zenith
60	Fly Catcher Fitting	Fly, Kill lite, PCI, Avro, Orchids
61	Window AC / Split AC / AC Plant/ Cassette AC	Blue Star, Voltas, LG, Fedders Lloyd, Hitachi, Samsung, Daikin, O' General, Mitsubishi, Panasonic, Carrier, Godrej, IFB
62	VRF/VRV Units & Ductable split unit inverter type	Blue star / Samsung / Hitachi / Mistubishi / Daikin / O General/ Voltas, Panasonic/ LG
63	Duct Insulation	The Supreme Industries Ltd. / K Flex / Armaflex / A Flex
64	Air diffuser / Grill	Cosmos / Dynacraft / Carrier
65	Volume Control Damper	Cosmos / Dynacraft / Carrier
66	Ventilation Fans	Carrier / Systemair / Kruger / Nicotra/ Almonard
67	AC Compressor	Emersion Copeland/ Kirloskar/ Bluestar/ Carrier/ Daikin/ Tecumseh
68	AC Condenser	Blue Star / Carrier / Hitachi / Daikin
69	Motors	CG, Bharat Bijlee, ABB, Siemens, Kirloskar
70	AHU / IDU	Neutech / Blue Star / Ethos / Voltas / Systemair / Flaktwood / VTS / Trane / York / Blue star / Samsung / Hitachi / Mistubishi / Daikin / O General/ Voltas, Panasonic/ LG
71	Cooling Tower	Paharpur / National / Perfect / Omkar / Choksi Group
72	Chiller line Insulating	Thermoshell / Beardsell Ltd./ Armaflax / Superlone / Century / ECOFLACK
73	Package unit	Blue Star / Hitachi / Daikin / Carrier / Voltas
74	Water Cooler	USHA, Blue Star, Voltas, Sidwal
75	Refrigerator	LG, Voltas, Whirlpool, Haier, Godrej, Samsung, Panasonic
76	Diesel Generating Set	Kirloskar Oil Engines Limited, Mahindra, Cummins, GCL, Ashok Leyland.
77	APFC RELAY / Power capacitor	EPCOS, SELEC, L&T, Schneider, Havells, C&S
78	Transformers	ABB, Siemens, BHEL, GEC, Bharat Bijlee, Crompton, Schneider/ Areva, transdelta, Highvolt, Fairdeal, Tesla, Kirloskar, Power star, Transformer & Rectifier.
78	Oil filtration plant	Spera, CEE DEE, CBS, Minimac, Kristorr
79	Voltage stabilizer	Melcon, servokon, V-guard, Microtek, Jindal, Servomax, Power control systems, GE, Apex
80	IFD	ABB, Motorola, Siemens, JAISuS, Honeywell, L&T
81	ULT	Endress & Hauser, Siemens, Honeywell, Pepperl & Fuchs, Nivelco, Rosemount
82	AB switch	Kiran/ Pactil / ABB
83	Hammer Drill machine	Bosch, Stanley, Dewalt, Hilti
84	Hydraulic crimping tools	Bosch, Stanley, Dowel
85	Thermal image camera	Bosch, TIPL, Fluke, Meco
86	Electric air blower	Bosch, Dewalt
87	Tools & Plant, Chain Pipe Wrenches	Taparia, Tata, Freemans, Fluke, Bosch, Stanley
88	Furniture's, Almirah, BOOK SHELF	Godrej or equivalent.
89	Binoculars	Nikon, ZEISS, Canon, Celestron
90	Day light pipe	Skyshade/ E- VIEW Global/ SKY PIPE/ EGO LIGHT/ EKOOL PLUS
91	Earthing pit Box cover	Sintex, True power, National
92	Ball Bearing	SKF / NBC / FAG
93	Capacitors for fan	Tibcon / Epcos / Syscap / Jimcap / Keltron / Havells
94	Solar Panel	Tata, Waaree, Havells, ABB, Adani, Vikram
95	Solar inverter	Tata, Waaree, Havells, ABB, Adani, Sungrow, Solis, Microtek
96	Solar water heater	V-Guard, Jain Irrigation, Sudarshan, Havells, Racold, Green sense
97	Computer	HP, Dell
98	Printer	HP, Brother
99	Air Cooler /Industrial Cooler	Symphony, Breezeair, Greencon, Arctic
100	Storage Tank	Sintex, Plasto
101	Telescopic Ladder	Corvids, Gorilla
102	Voltage stabilizer for AC	V-guard, IFB, Microtek.
103	BESS	Su-vastika, Lotus, Waaree, Tata, Exide, Amararaja, Panasonic, Schneider, Cummins
104	Portable Generator(Petrol/Kerosene)	Honda, Birla
105	Maintenance free earthing	Cube earthing

Note – i) Only ISI / BIS marked items shall be accepted. If ISI / BIS marked materials are not available in market then prior approval shall be taken from Sr. DEE(G)BSL before supply.

ii) The above makes are acceptable subject to fulfillment of technical specification requirement.

Indian Standard codes/IEC List

Annexure-II

<i>S.No</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IEC 61439	The standards for low voltage switchgear and control gear assemblies		
(2)	IS 732:1989	Code of practice for electrical wiring installations (third revision)	March 2010	
(3)	IS 4648:1968	Guide for electrical layout in residential buildings	August 2012	
(4)	IS 8061:1976	Code of practice for design, installation and maintenance of service lines upto and including 650 V	March 2011	
(5)	IS 8884:1978	Code of practice for the installation of electric bells and call systems	August 2012	
(6)	IS 5578:1984/ IEC 60391 (1972)	Guide for marking of insulated conductors (first revision)	March 2011	
(7)	IS 1353:1985/ IEC 60445 (1973)	Guide for uniform system of marking and identification of conductors and apparatus terminals	July 2012	
(8)	IS 3234:1991/ IEC 60909: 1988	Guide for short circuit current calculations in three-phase ac systems (superseding IS 5728)	August 2012	
(9)	IS 7752 (Part 1):1975	Guide for improvement of power factor in consumer installation: Part 1 Low and medium supply voltages	March 2011	
(10)	IS 3646 (Part 1):1992	Code of practice for interior illumination: Part 1 General requirements and recommendations for working interiors (first revision)	March 2008	
(11)	IS 3646 (Part 2):1966	Code of practice for interior illumination: Part 2 Schedule of illumination and glare index	March 2008	
(12)	IS 3646 (Part 3):1968	Code of practice for interior illumination: Part 3 Calculation of coefficients of utilization by the BZ method	March 2008	
(13)	IS 4347:1967	Code of practice for hospital lighting	May 2010	
(14)	IS 6665:1972	Code of practice for industrial lighting	May 2010	
(15)	IS 2672:1966	Code of practice for library lighting	May 2010	
(16)	IS 10118 (Part 1):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 1 General	March 2011	
(17)	IS 10118 (Part 2):1982	Code of practice for selection, installation and maintenance of Switchgear and controlgear : Part 2 Selection	March 2011	
(18)	IS 10118 (Part 3):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 3 Installation	March 2011	
(19)	IS 10118 (Part 4):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 4 Maintenance	March 2011	
(20)	IS 4146:1983	Application guide for voltage transformers (first revision)	September 2011	
(21)	IS 4201:1983	Application guide for current transformers (first revision)	September 2011	
(22)	IS 5547:1983	Application guide for capacitor voltage transformers (first revision)	September 2011	
(23)	IS 2309:1989	Code of practice for protection of buildings and allied structures against lightning (second revision)	March 2010	1

(24)	IS 3043:1987	Code of practice for earthing	March 2011	2
(25)	IS 5216 (Part 1):1982	Recommendations on safety procedures and practices in electrical work: Part 1 General (first revision)	March 2010	
(26)	IS 5216 (Part 2):1982	Recommendations on safety procedures and practices in electrical work: Part 2 Life saving techniques (first revision)	March 2010	
ELECTRIC FANS				
(1)	IS 555:1979	Electric table type fans and regulators (third revision)	July 2010	2
(2)	IS 1169:1967	Electric pedestal type fans and regulators (first revision)	Mar 2009	6
(3)	IS 374:1979	Electric ceiling type fans and regulators (third revision)	September 2010	6
(4)	IS 2997:1964	Air circulator type electric fans and regulators	July 2010	8
(5)	IEC: 60665 (1981) IS 2312:1967	Propeller type ac ventilating fans (first revision) Draft Standard issued in wide circulation	July 2010	8
(6)	IS 3588:1987	Electric axial flow fans (first revision)	August 2009	1
(7)	IS 3963:1987	Roof extractor units (first revision)	August 2009	3
(8)	IS 4283:1981	Hot air fans (first revision)	August 2009	3
(9)	IS 6272:1987	Industrial cooling fans (man coolers) (first revision)	August 2009	2
(10)	IS 4894:1987	Centrifugal fans (first revision)	August 2009	3
(11)	IS 11037:1984	Electronic type fan regulators	August 2010	3
(12)	IS 12155:1987	General and safety requirements for fans and regulators for household and similar purposes		
LOW VOLTAGE SWITCH GEAR AND CONTROL GEAR				
(1)	IS 4237:1982	General requirements for switchgear and controlgear for voltages not exceeding 1000 volts ac or 1200 volts dc (first revision) [superseded by IS 13947 (Part 1):1993]		
(2)	IS 6875 (Part 1):1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac & 1200 V dc: Part 1 General requirements [superseded by IS 13947 (Part 5/Section 1)]		
(3)	IS 6875 (Part 2):1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac and 1200 V dc: Part 2 Push- buttons and related control switches [Superseded by IS 13947 (Part 5/Section1)]		
(4)	IS 6875 (Part 3):1980	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac and 1200 V dc : Part 3 Rotary control switches [superseded by IS 13947 (Part 5/ Section 1)]		
(5)	IS 10027:2000	Composite units of air-break switches and rewirable type fuses for voltages not exceeding 650 volt ac - Specification (first revision)	March 2010	
(6)	IS 4064 (Part 1):1978	Air-break switches, air break disconnectors, air-break switch disconnectors and fuse-combination units for voltages not exceeding 1000 V ac or 1200 V dc: Part 1 General requirements (revised) [superseded by IS 13947 (Part 3): 1993]		
(7)	IS 2675:1983	Enclosed Distribution Fuse Boards and Cut Outs for voltages not exceeding 1000 V A.C. or 1200 V D.C.	March 2011	
(8)	IS 8828:1996	Circuit-breakers for over current protection for		

		household and similar installations (second revision)		
(9)	IS 13032:1991	Miniature circuit breaker boards for voltage upto and including 1 000 Volt ac	March 2011	1
(10)	IS 12640 (Part 1):2008	Residual current operated circuit-breakers for household and similar uses : Part 1 circuit-breakers without integral over current protection (RCCBs) (First Revision)		
(11)	IS 12640 (Part 2):2008	Residual current operated circuit-breakers for household and similar uses: Part 2 circuit breakers with integral over current protection (RCBOs) (First Revision)		
(12)	IS 2959:1985	Contactors for voltages not exceeding 1000 V ac or 1200 V dc (first revision) [superseded by IS 13947 (Part 4/ Section 1)]		
(13)	IS 12021:1987	Specification for control transformers for switchgear and controlgear for voltages not exceeding 1000 Volt AC	March 2010	2
(14)	IS 5039:1983	Distribution pillars for voltages not exceeding 1000 volts (first revision)	March 2011	2
(15)	IS 8623 (Part 1): 1993/ IEC 60439-1 (1985)	Specification for low voltage switchgear and controlgear assemblies: Part 1 Requirements for type-tested and partially type tested assemblies (first revision).	March 2008	2
(16)	IS 8623 (Part 2):1993/ IEC 60439-2 (1987)	Specification for low voltage switchgear and controlgear assemblies: Part 2 Particular requirements for busbar trunking systems (busways)-(first revision)	March 2008	2
(17)	IS 8544 (Part 1):1977	Motor starters for voltages not exceeding 1000 V: Part Direction line ac starters [superseded by IS 13947 (Part 4/Section 1): 1993]		2
(18)	IS 8544 (Part 2):1977	Motor starters for voltages not exceeding 1000 V : Part 2 Star-delta starters [superseded by IS 13947 (Part 4/ Section 1): 1993]		
(19)	IS 8544 (Part 3/ Sec 1): 1979	Motor starters for voltages not exceeding 1000 V : Part 3 Rheostatic motor starters, Section 1 General requirements [superseded by IS 13947 (Part 4/Section 1): 1993]		
(20)	IS 8544 (Part 4):1979	Motor starters for voltages not exceeding 1000 V: Part 4 Reduced voltage ac starters: two step auto-transformer starters [superseded by IS 13947 (Part 4/Section 1): 1993]		
POWER CABLE				
(1)	IS 94:1990/ IEC 60227-1 to 5 (1979)	PVC Insulated cables for working voltages upto and including 1100 V	February 2010	5
(2)	IS 694: 2010	Polyvinyl chloride insulated sheathed and unsheathed cables with rigid and flexible conductor for rated voltages upto and including 450/750 V : Part 1 General requirements (fourth revision)		1
(3)	IS 1554 (Part 1): 1988/ IEC 60502 (1983)	PVC insulated (heavy duty) electric cables: Part 2 For working voltages upto and including 1100 V (Third revision)		
(4)	IS 3961 (Part 1):	Recommended current ratings for cables: Part 1 Paper insulated lead sheathed cables	November 2011	

	1967			
(5)	IS 4288:1988	PVC insulated (heavy duty) electric cables with solid aluminium conductors for voltages upto and including 1100 V (second revision) (withdrawn)		
(6)	IS 4289 (Part 1): 1984/ IEC 60245-5	Flexible cables for lifts and other flexible connections: Part 1 Elastomer insulated cables (first revision)		
ELECTRIC WIRING ACCESSORIES				
(1)	IS 9537 (Part 1): 1980/ IEC 60614-1 (1978)	Conduits for electrical installations: Part 1 General Requirements	November 2010	(1)
(2)	IS 9537 (Part 2): 1981	Conduits for electrical installations: Part 2 Rigid steel conduits (superseding IS:1653)	May 2012	(2)
(3)	IS 3480:1966	Flexible steel conduits for electrical wiring	May 2012	(1)
(4)	IS 2667:1988	Fittings for rigid steel conduits for electrical wiring (first revision) [Superseded by IS 14768 (Part 2): 2003]	February 2008	
(5)	IS 3837:1976	Accessories for rigid steel conduits for electrical wiring (first revision)	May 2012	(1)
(6)	IS 9537 (Part 4):1983	Conduits for electrical installations: Part 4 Pliable self-recovering conduits of insulating materials	May 2012	
(7)	IS 9537 (Part 5): 2000/ IEC 60614-2-3 (1990)	Conduits for a electrical installations: Part 5 Pliable conduits of insulating material [Superseding IS 6946]	June 2010	
(8)	IS 3419:1989	Fittings for rigid non-metallic conduits (second revision)	May 2012	
(9)	IS 14772:2000/ IEC 60670-1 (1989)	Enclosures for accessories for household and similar fixed electrical installations [Superseding IS 5133 (Part 1 and 2)]	May 2010	
(10)	IS 2412:1975	Link clips for electrical wiring (first revision)	May 2012	(2)
(11)	IS 371:1999	Ceiling roses (third revision)	March 2010	(4)
(12)	IS 3854:1997/ IEC 60669-1 (1998)	Switches for domestic and similar purposes (second revision)	July 2012	(6)
(13)	IS 4615:1968	Switch-socket outlets (non-interlocking type) (Withdrawn)		
(14)	IS 4160:2005/ IEC 60884-2-6 (1997)	Interlocking switch socket outlets - Specification (first revision)	June 2010	
(15)	IS 1293:2005/ IEC 60884-1 (2002)	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes - Specification (third revision)	June 2010	(5)
ELECTRICAL LAMPS AND THEIR AUXILIARIES				
(1)	IS 418:2004/ IEC 60064 (1993)	Tungsten filament lamps for domestic and similar general lighting purposes (fourth revision)	March 2009	(4)
(2)	IS 2418 (Part 1): 1977/ IEC 81 (1974)	Tubular fluorescent lamps for general lighting service: Part 1 Requirements and tests (first revision)	December 2010	(8)
(3)	IS 9900 (Part 1):1981 / IEC 188 (1974)	High pressure mercury vapour lamps: Part 1 Requirements and test [Superseding IS 2183 and IS 7023]	October 2012	(4)

(4)	IS 9974 (Part 1): 1981/ IEC 662 (1980)	High pressure sodium vapour lamps : Part 1 General requirements and tests	October 2012	(4)
(5)	IS 1258:2005/ IEC 61184 (1997)	Bayonet lamp holders (fourth revision)	June 2010	(3)
(6)	IS 3323:1980/ IEC 60400 (1972)	Bi-pin lamp holders for tubular fluorescent lamps (first revision)	October 2012	(1)
(7)	IS 3324:1982/ IEC 400 (1972)	Holders for starters for tubular fluorescent lamps (first revision)	June 2008	
(8)	IS 2215:2006/ IEC 60155 (1993)	Starters for fluorescent lamps (third revision)	Jun 2010	
(9)	IS 1534 (Part 1):1977 / IEC 82 (1973)	Ballasts for fluorescent lamps: Part 1 For switch start circuits (second revision)	July 2011	(5)
(10)	IS 1569:1976/ IEC 566	Capacitors for use in tubular fluorescent	July 2011	(1)
(11)	IS 6616:1982/ IEC 262 (1969)	Ballasts for high pressure mercury vapour Lamps (first revision)	July 2011	(1)
LIGHT FITTINGS AND LUMINAIRES				
(1)	IS 1913 (Part 1):1978	General and safety requirements for luminaires: Part 1 Tubular fluorescent lamps (second revision)		
(2)	*IS 10322 (Part1) :1982 / IEC 598 - 1(1979)	Luminaires: Part 1 General requirements	May 2010	
(3)	IS 10322 (Part 2):1982 / IEC 598 - 1(1979)	Luminaires: Part 2 Constructional Requirements	May 2010	
(4)	IS 10322 (Part 5/ Sec. 2):2012	Luminaires: Part 5 Particular requirements, Sec 2 Recessed luminaires (First Revision)	March 2012	
(5)	IS 10322 (Part 5/ Sec. 3):2012/ IEC 60598-2-3 (1979)	Luminaires: Part 5 Particular requirements, Sec 3 Luminaires for road and street lighting (First revision)	March 2012	
(6)	IS 10322 (Part 5/ Sec 4):1987/ IEC 60598-2-4 (1979)	Luminaires: Part 5 Particular requirements, Section 4 Portable general purpose	May 2010	1
(7)	IS 10322 (Part 5/ Sec 5):1987/ IEC 60598-2-5	Luminaires: Part 5 Particular requirements, Section 5 Flood lights [superseding IS 1947]	May 2010	(1)
(8)	IS 3287:1965	Industrial lighting fittings with plastic reflectors		
(9)	IS 1777:1978	Industrial luminaires with metal reflectors (first revision)		
(10)	IS 2206 (Part 1):1984	Flameproof electric lighting fittings: Part 1 Well-glass and bulkhead types (first revision)		
(11)	IS 3528:1966	Waterproof electric lighting fittings	May 2010	

(12)	IS 3553:1966	Watertight electric lighting fittings	May 2010	
(13)	IS 8030:1976/ IEC 162 (1972)	Luminaires for hospitals	March 2008	
(14)	IS 7537:1974	Road traffic signals	March 2008	
(15)	IS 9583:1981/ IEC 598-2-22 (1980)	Emergency lighting units	March 2008	
ELECTRICAL APPLIANCES				
(1)	IS 302 (Part 1): 2008/ IEC 60335-1 (2006)	Safety of household and similar electrical appliances: Part 1 General requirements (sixth revision)		(1)
(2)	IS 2268:1994	Electric call bells and buzzers for indoor use (second revision)	March 2009	
(3)	IS 3412:1994	Electric water boilers (second revision)	March 2009	
ELECTRICAL INSTRUMENTS				
(1)	IS 6236:1971/ IEC 60258 (1968)	Direct recording electrical measuring Instruments	January 2010	
(2)	IS 1248 (Part 1): 2003/ IEC 600 51-1 (1997)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 1 General requirements (fourth revision)	Sep 2008	
(3)	IS 1248 (Part 2): 2003/ IEC 600 51-2 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 2 Ammeters and voltmeters (third revision)	Aug 2008	
(4)	IS 1248 (Part 3): 2003/ IEC 600 51-3 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 3 Wattmeters and varmeters (third revision)	Aug 2012	
(5)	IS 1248 (Part 4): 2003/ IEC 600 51-4 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 4 Frequency meters (third revision)	Aug 2008	
(6)	IS 1248 (Part 5): 2003/ IEC 600 51-5 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 5 Phase meters, power factor meters and synchroscope (third revision)	Aug 2008	
(7)	IS 722 (Part 1):1998	AC electricity meters : General requirement and tests		
(8)	IS 722 (Part 2):1977	AC electricity meters: Part 2 Single-phase whole-current watt-hour meters, Class 2 (first revision)		
(9)	IS 722 (Part 3):1988	AC electricity meters: Part 3 Three-phase whole current and transformer operated and single-phase transformer operated watt-hour meters, class 2 (second revision)		
(10)	IS 722 (Part 5):1980	AC electricity meters: Part 5 Volt-ampere hour meters for restricted power factor range, class 3.5 (first revision)		
(11)	IS 722 (Part 7/Sec 1): 1987	AC electricity meters: Part 7 Volt-ampere hour meters for full power factor range, Section 1 General requirements (first revision)		
(12)	IS 722 (Part 8):1972	AC electricity meters: Part 8 Single-phase 2-wire whole current watt-hour meter (class 1.0)		

(13)	IS 722 (Part 9):1972	AC electricity meters: Part 9 Three-phase whole current and transformer operated watt-hour meters and single- phase two-wire transformer operated watt-hour meters (class 1.0)		
(14)	IS 8530: 1977 IEC 60211:1966	Maximum demand indicators (class 1)		
(15)	*IS 2992:1987	Insulation resistance testers, hand operated (magneto generator type) (second revision)	Jan 2010	
INSTRUMENT TRANSFORMERS				
(1)	IS 2705 (Part 1): 1992/ IEC 60185 (1966)	Current transformers: Part 1 General requirements (second revision)	Aug 2012	(1)
(2)	IS 2705 (Part 2): 1992/ IEC 60185 (1966)	Current transformers: Part 2 Measuring current transformers (second revision)	Aug 2012	
(3)	IS 2705 (Part 3): 1992/ IEC 60185 (1966)	Current transformers: Part 3 Protective current transformers (second revision)	Aug 2012	
(4)	IS 2705 (Part 4): 1992/ IEC 60185 (1966)	Current transformers: Part 4 Protective current transformers for special purpose applications (second revision)	Aug 2012	
(5)	IS 6949:1973	Summation current transformers	Sep 2011	
FUSES				
(1)	IS 9224 (Part 1):1979	Low voltage fuses: Part 1 General requirements [superseded by IS 13703 (Part 1):1993]		
(2)	IS 9224 (Part 2):1979	Low voltage fuses: Part 2 Supplementary requirements for fuses for industrial applications (superseding IS 2208) [superseded by IS 13703 (part 2/Section 1):1993]		
(3)	IS 2086:1993	Carriers and bases used in rewirable type electric fuses for voltages upto 650 V (third revision) [Superseding IS 8724]	Mar 2009	(1)
(4)	IS 9926:1981	Fuse wires used in rewirable type electric fuses upto 650 volts	Mar 2011	
(5)	IS 8187:1976/ IEC 269-3 (1973)	D-type fuses		
MISCELLANEOUS				
(1)	IS 2551:1982	Danger notice plates (first revision)	Mar 2010	
(2)	IS 2448 (Part 1):1963	Adhesive insulating tapes for electrical purposes: Part 1 Tapes with cotton textile substrates	Oct 2010	(5)
ELECTROTECHNICAL VOCABULARY				
(1)	IS 1885 (Part 1):1961	Electrotechnical vocabulary: Part 1 Fundamental Definitions	Jul 2012	(2)
(2)	IS 1885 (Part 9):1992/ IEC 60050 (446):1983	Electrotechnical Vocabulary: Part 9 Electrical relays (second revision)	Jul 2012	
(3)	IS 1885 (Part 11):1966	Electrotechnical vocabulary: Part 11 Electrical Measurements	Jul 2012	
(4)	IS 1885	Electrotechnical vocabulary: Part 16 Lighting, Section	Jul 2012	

	(Part 16/ Sec 1):1968	1 General aspects		
(5)	IS 1885 (Part 16/ Sec. 2):1968	Electrotechnical vocabulary: Part 16 Lighting, Section 2 General illumination, lighting fittings and lighting for traffic and signaling	Jul 2012	
(6)	IS 1885 (Part 16/ Sec. 3):1967	Electrotechnical vocabulary: Part 16 Lighting, Section 3 Lamps and auxiliary apparatus	Jul 2012	
(7)	IS 1885 (Part 17):1979	Electrotechnical vocabulary: Part 17 Switchgear and control gear (first revision)	Jul 2012	
(8)	IS 1885 (Part 32):1993/ IEC 60050 (461):1984	Electrotechnical Vocabulary: Part 32 Electric cables (first revision)	Mar 2009	
SAFETY				
(1)	IS 4770:1991	Rubber Gloves for electrical purposes		
(2)	IS 5424:1969	Rubber mats for electrical purpose (Superseded by IS 15652:2006)	April 2011	(2)

CHAPTER- V

FORMS FOR TENDER ETC.

Proforma A

LIST OF WORKS COMPLETED IN LAST THREE FINANCIAL YEARS

SN	Description of work	Organization for whom executed	Approximate value of contract at the time of award.	Date of award	Date of scheduled completion of work	Actual completion	Final value of contract

Signature of the Contractor.

Proforma B

LIST OF WORKS ON HAND

SN	Description of work	Contract value	Approximate value of balanced work yet to be done	Date of award

Signature of the Contractor

FORM 14**उपबंद**

सविंदा करार सं.....तारीख.....यह करार आनुचछेद एक पक्षकार के रूप में.....रेल प्रशासन के माध्यम से कार्यरत भारत के राष्ट्रपति, जिनहे ईस्मे आगे "रेल" कहा गया है, तथा दूसरे पक्षकार के रूप में मेसर्स..... जिनहे इसमें आगे ठेकेदार कहा गया है, के बीच आज तारीख.....को किया गया ।।

ठेकेदारों को इसमें उपापबद्ध अनुसूची में उपवर्णित.....कार्य के निष्पादन के लिए ता.....की मुद्रित/अग्रिम संशोधन पर्ची सं.....संशोधित कार्य पुस्तिका भाग III में और ता..... की मुद्रित/अग्रिम संशोधन पर्ची सं.....तक संशोधित सवाछता संबंधी कार्य पुस्तिका में अंतर्विष्ट मध्य रेल के विनिर्देशों तथा तारीख..... की मुद्रित/अग्रिम संशोधन पर्ची सं तक संशोधित मध्य रेल की दर अनुसूची, भाग I तथा विशेष विनिर्देशों, यदि कोई हो, पर और इससे उपापबद्ध रेखाचित्र के अनुरोध कार्य करो का करार किया है और उक्त का निष्पादन ऐसा कार्य है, जिससे जाता हितबद्ध है।

अब यह विलेख इस बात का साक्षी है की, रेलों द्वारा किए जो वाले संदायों के प्रतिफलस्वरूप, ठेकेदार उक्त अनुसूची में उपवर्णित उक्ता कार्य का सम्यक रूप से निष्पादन करेंगे और उक्ता कार्य मध्य रेल के समाधानप्रद रूप में बहुत तत्परता, सावधानी और सही ढंग से कुशलता से करेंगे तथा तारीख.....को या इससे पहले उक्ता विनिर्देशों और उक्ता रेखाचित्रों तथा सविन्दा की उक्ता शर्तों के अनुसार पूरा करेंगे और उक्ता कार्यों के पूरा होने की प्रामाणिक तारीख से.....कलेंडर मास अवधि के लिए उनका अनुरक्षण करेंगे तथा उसमें उल्लेखित सभी शर्त (जिनहे इस सविन्दा का भाग समझा और मान जाएगा मानें वे इसमें पूर्णता उपवर्णित की गई है) को मानेंगे, पूरा करेंगे उनका निर्वाह करेंगे और रेल इसके दुवारा करार करती है की, यदि ठेकेदार उक्ता कार्य का पूर्वोक्त रीति से सम्यक रूप से निष्पादन करेगा उक्ता निर्बंधनों और शर्तों का पाला और विवाह करेगा तो रेल उक्ता कार्यों के अंतिम रूप से पूरा हो जाने पर ठेकेदार को उक्ता कार्यों के संबंध में इससे उपबद्ध अनुसूची में विनिर्दिष्ट दरों पर देय रक्कम का संदाय करेंगी या कराएंगी ।

ठेकेदार.....	पदनाम.....
पता.....	भारत के राष्ट्रपति के लिए
तारीख.....	तारीख.....
ठेकेदार के हस्ताक्षर, साक्षियों के हस्ताक्षर तथा पते	साक्षी
1.....	1.....
2.....	2.....

MANDATE FORM FOR EFT/NEFT

1. Particulars of the Party.

- i) Name:- _____
- ii) Address:- _____
- iii) Phone No.:- _____ Mobile No. _____
Fax No:- _____
- iv) Income Tax PAN No. _____
- v) E Mail ID _____

2. Particulars of Bank Account

- i) City :- _____
- ii) Bank Name: _____
- iii) Branch: _____
- iv) Bank Address:- _____
- v) Bank Tel. No. _____ FAX no. _____
- vi) Bank MICR Code(9 Digit) _____
- vii) Bank IFS Code: _____
- viii) Bank Account No. _____
(Please enclose a canceled blank cheque)
- ix) Account type :- (Saving/Current/Cash Credit) _____

3. Certified that the particulars furnished with reference to Bank Account are correct and the bank guarantees to honor all EFT/NEFT advices/reports as per RBI Regulations.

Bank Seal Signature of the authorized official of the bank

4. DECLARATION BY THE PARTY

- i. I hereby declare that the particulars given in this mandate form are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, the User institution i.e. FA & CAO/Central Railway Mumbai will not be held responsible.

Date _____
Signature of the party with stamp

FORM-15
(On Stamp Paper of Requisite Value)
GUARANTEE BOND FOR SECURITY DEPOSIT

(TO BE USED BY APPROVED SCHEDULE BANKS/NATIONALISED BANKS)

1. In consideration of the President of India " hereinafter called "the Government" having agreed to exempt.....(hereinafter called "the said Contractor (s)" from the demand, under the terms and conditions of an Agreement dated.....made between.... and..... for (hereinafter called "the said Agreement") of security deposit for the due fulfillment by the said Contractor (s) of the terms and conditions contented in the said Agreement, on production of a Bank guarantee for Rs.....(Rupees.....only). We,..... (indicate the name of Bank) hereinafter referred to as "the Bank" at the request of..... (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement.
2. We..... (indicate the name of Bank) do hereby undertake to Pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement or by reason of the Contractor (s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding.....
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor (s)/ supplier (s) in any suit for proceeding pending before any court or Tribunal relating thereto our liability under this present contract being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Contractor (s)/supplier (s) shall have no claim against us for making such payment.

4. We..... (indicate the name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till..... office / Department Ministry of.....certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee. Unless a Demand or claim under this guarantee is made on us in writing on or before the..... (b) we shall be discharged from all liability under this guarantee thereafter.
5. We..... (indicate the name of Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor (s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor (s) or for any forbearance, act or omission on the part of the Government or any indulgence by the

Government to the said Contractor (s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

- 6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s)/ Supplier (s).
- 7. We..... (indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.
Dated : the..... day of.....20
for.....
(indicate the name of Bank)

-
- (a) The guarantee shall be valid for a period of two months after the expiry of the guarantee period of the equipment.



FORM-16**STANDING INDEMNITY BOND FOR 'ON ACCOUNT' PAYMENTS****(On paper of requisite stamp value)**

We, M/s..... hereby undertake that we hold at our stores Depot/s at..... for and on behalf of the President of India acting in the premises through the General Manager or his successor of Central Railway (hereinafter referred to as "The Purchaser") all materials for which 'On Account' payments have been made to us against the Contract for supply and erection of (Name of work) *.on the section/s of Central Railway also referred to as Group/s..... vide letter of Acceptance of Tender No..... dated..... and materials handed over to us by the purchaser for the purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to him.

We shall be entirely responsible for the safe custody and protection of the said materials against all risk till they are duly delivered as erected equipment to the purchaser or as he may direct otherwise and shall indemnify the purchaser against any loss damage or deterioration whatsoever in respect of the said materials while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any officer authorized by the General Manager incharge of Railway Electrification (whose address will be intimated in due course).

Should any loss, damage or deterioration of materials occur or surplus materials disposed off and refund becomes due, the Purchaser shall be entitled to recover from us the full cost as per prices included in Schedule 3 to the Contract (as applicable) and in respect of other materials as indicated in part I, Chapter- IV, section 1 and also compensation for such loss or damage if any long with the amount to be refunded without prejudice to any other remedies available to him by deduction from any sum due or any sum which at any time hereafter becomes due to us under the said or any other Contract.

Dated this day..... day of..... 20

for and on behalf of

M/s.....(Contractor)

Signature of witness

Name of witness in Block Letters

Address.

* Strike out whichever is not applicable

FORM-19
(On Stamp Paper of Requisite Value)
GUARANTEE BOND AGAINST "ON ACCOUNT" PAYMENTS

(TO BE USED BY APPROVED SCHEDULE BANKS/NATIONALISED BANKS)

1. In consideration of the President of India " hereinafter called "the Government") having agreed to exempt.....(hereinafter called "the said Contractor (s)") from the demand, under the terms and conditions of an Agreement dated.....made between.... and..... for (hereinafter called "the said Agreement") of "On- Account" Payments for the due fulfillment by the said Contractor (s) of the terms and conditions contented in the said Agreement, on production of a Bank guarantee for Rs.....(Rupees.....only).

We,..... (indicate the name of Bank) hereinafter referred to as "the Bank" at the request of..... (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement.

2. We..... do hereby undertake to Pay (indicate the name of the Bank) the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement or by reason of the Contractor (s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding.....
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor (s)/ supplier (s) in any suit for proceeding pending before any court or Tribunal relating thereto our liability under this present contract being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Contractor (s)/supplier(s) shall have no claim against us for making such payment.

4. We..... (indicate the name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till..... office/ Department Ministry of.....certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee. Unless a Demand or claim under this guarantee is made on us in writing on or before the..... (b) we shall be discharged from all liability under this guarantee thereafter.
5. We..... (indicate the name of Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor (s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such

variation, or extension being granted to the said Contractor (s) or for any forbearance, act or omission on the part of the Government or any indulgence by the Government to the said Contractor (s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

- 6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s)/ Supplier (s).
- 7. We..... (indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.

Dated : the..... day of..... 20

for.....

(indicate the name of Bank)

-
- 1. The guarantee shall be valid for a period of two months after the completion of installation and testing to the satisfaction of Engineer-in-Charge.



FORM-21**(On Stamp Paper of Requisite Value)****GUARANTEE BOND AGAINST PROVISIONAL ACCEPTANCE PAYMENTS****(TO BE USED BY APPROVED SCHEDULE BANKS/NATIONALISED BANKS)**

1. In consideration of the President of India " hereinafter called "the Government" having agreed to exempt.....(hereinafter called "the said Contractor (s)" from the demand, under the terms and conditions of an Agreement dated.....made between.... and..... for (hereinafter called "the said Agreement") of Provisional Acceptance Payments for the due fulfillment by the said Contractor (s) of the terms and conditions contented in the said Agreement, on production of a Bank guarantee for Rs.....(Rupees.....only). We,..... hereinafter referred to as "the Bank" (indicate the name of Bank) at the request of..... (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement.
2. We..... (indicate the name of the Bank) do hereby undertake to Pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement or by reason of the Contractor (s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding.....
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor (s), supplier (s) in any suit for proceeding pending before any court or Tribunal relating thereto our liability under this present contract being absolute and unequivocal.
The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor (s)/supplier (s) shall have no claim against us for making such payment.
4. We..... (indicate the name of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till..... office/Department Ministry of.....certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee. Unless a Demand or claim under this guarantee is made on us in writing on or before the..... (b) we shall be discharged from all liability under this guarantee thereafter.
5. We..... (indicate the name of the Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor (s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor (s) or for any forbearance, act or omission on the part of the Government or any indulgence by the Government to the said Contractor (s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s)/ Supplier (s).

7. We..... (indicate the name of the Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.

Dated: the..... day of..... 20

for.....

(indicate the name of Bank)

(a) The guarantee shall be valid for a period of two months after the completion of work.

ANNEXURE 'A'

DECLARATION FORMAT

As per GCC April 2022, Clause No.16 Employment / Partnership etc. of Retired Railway Employees.

Clause	CONDITIONS	WRITE YES/NO WHICH IS APPLICABLE
16 (a)	(i) Should a tenderer be a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, OR	YES/NO 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.
	(ii) Should a tenderer being partnership firm / joint venture (JV) / registered society / registered trust etc. have as one of its partners a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, OR	
	(iii) Should a tenderer 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	
16 (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.	YES/NO If yes 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.
16 (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	YES/NO If yes then the tenderer at the time of submission of tender, will inform the Authority inviting tenders the details of such persons.
Note: - If information as required as per 16. a), b), c) above has not been furnished; contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of contract.		

Date:
Place:

(Name of contractor/firm)

Signature

Annexure-B**SAMPLE FORMAT OF COMPLETION CERTIFICATE**

SN	Name of Item	Description
1	LOA No. and date	
2	Name of the work	
3	Contract Agreement No. and date	
4	Name of the contractor	
5	Original Agreement Value	
6	Revised Agreement Value, if any	
7	Date of commencement of work	
8	Date of completion of work as per original / revised agreement	
9	Date of actual completion	
10	Cumulative payment made to the contractor up to the Last paid bill	
11	Total Penalty Imposed (If No penalty, please specified as NIL)	
12	Performance of the contractor	

This certificate submitted by the tenderer should be signed by competent authority of the concerned department.

Annexure –VIA

Para 5 of the Instructions to Tenderers

(Bid Security)

Bank Guarantee Bond from any scheduled commercial bank of India
(On non-judicial stamp paper, which should be in the name of the Executing Bank).

Name of the Bank: -----

President of India,

Acting through,

..... Railway,

Beneficiary: Railway

Date:.....

Bank Guarantee Bond No.:**Date:-----**

In consideration of the President of India acting through----- (***Designation & address of Contract Signing Authority***), Railway,, (hereinafter called "The Railway") having invited the bid for _____ through Notice inviting tender (NIT) No. _____, We have been informed that [***Insert name of the Bidder***]..... (***hereinafter called "the Bidder"***) intends to submit its bid (hereinafter called "the Bid")

WHEREAS, the Bidder is required to furnish Bid Security for the sum of [***Insert required Value of Bid Security***], in the form of Bank Guarantee, according to conditions of Bid.

AND

WHEREAS,.....[***Insert Name of the Bank***], with its Branch.....[***Insert Address***] having its Headquarters office at..... [***Insert Address***], hereinafter called the **Bank**, acting through.....[***Insert Name and Designation of the authorised persons of the Bank***], have, at the request of the Bidder, agreed to give guarantee for Bid Security as hereinafter contained, in favour of the Railway:

1. KNOW ALL MEN that by these present that I/We the undersigned [***Insert name(s) of authorized representatives of the Bank***], being fully authorized to sign and incur obligations for and on behalf of the Bank, confirm that the Bank, hereby, unconditionally and irrevocably guarantee to pay to the Railway full amount in the sum of [***Insert required Value of Bid Security***] as above stated.
2. The Bank undertakes to immediately pay on presentation of demand by the Railway any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the Railway on the Bank shall be final, conclusive and binding, absolute and unequivocal on the Bank notwithstanding any disputes raised/ pending before any Court, Tribunal, Arbitration or any Authority or any threatened litigation by the Bidder or Bank.
3. The Bank shall pay the amount as demanded immediately on presentation of the demand by Railway without any reference to the Bidder and without the Railway being required to show grounds or give reasons for its demand of the amount so demanded.
4. The guarantee hereinbefore shall not be affected by any change in the constitution of the Bank or in the constitution of the Bidder.
5. The Bank agrees that no change, addition, modifications to the terms of the Bid document or to any documents, which have been or may be made between the Railway and the Bidder, will in any way absolve the Bank from the liability under this guarantee; and the Bank, hereby, waives any requirement for notice of any such change, addition or modification made by Railway at any time.
6. This guarantee will remain valid and effective from.....[***insert date of issue***]till[***insert date, which should be minimum 90 days beyond the expiry of validity of Bid***]. Any demand in respect of this Guarantee should reach the Bank within the validity period of Bid Security.

7. The Bank Guarantee is unconditional and irrevocable.
8. The expressions Bank and Railway herein before used shall include their respective successors and assigns.
9. The Bank hereby undertakes not to revoke the guarantee during its currency, except with the previous consent in writing of the Railway. This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No.758.
10. The Bank hereby confirms that it is on the SFMS (Structured Financial Messaging System) and shall invariably send the advice of this Bank Guarantee to the following bank details –

IFSC CODE	SBIN00RAIL
IFSC TYPE	BRANCH
BANK NAME	STATE BANK OF INDIA
BRANCH NAME	RAIL
CITY NAME	NAVI MUMBAI
ADDRESS	SECTOR-11, CBD BELAPUR, NAVI MUMBAI
DISTRICT	NAVI MUMBAI
STATE	MAHARASHTRA
BG ENABLED	YES

11. The Guarantee shall be valid in addition to and without prejudice to any other security Guarantee(s) of Bidder in favour of the Railway. The Bank, under this Guarantee, shall be deemed as Principal Debtor of the Railway.

Date

Place.....

.....

Bank's Seal and authorized signature(s)

[Name in Block letters]

[Designation with Code No.].....

[P/Attorney] No.

Witness:

1 Signature, Name & Address & Seal

2 Signature, Name& address & Seal

Bank's Seal

*[P/Attorney]*No.

Note: All italicized text is for guidance on how to prepare this bank guarantee and shall be deleted from the final document.

Annexure –VIB

Reference -Para 10.2 & 17.15.2 of Tender Form (Second Sheet) of Annexure I of ITT

Each Bidder or each member of a JV must fill in this form separately:

NAME OF BIDDER/JV PARTNER:

Annual Contractual Turnover Data for the Previous 3/4 Years (Contractual Payment only)			
Year	Amount Currency	Exchange Rate	Indian National Rupees Equivalent
Average Annual Contractual Turnover for last 3 years			

1. The average annual contractual turnover shall be calculated as an average of “total contractual payments” in the previous three financial years. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.
2. The information supplied shall be substantiated by data in the audited balance sheets and profit and loss accounts for the relevant years in respect of the bidder or all members constituting the bidder.
3. Contents of this form should be certified by a Chartered Accountant duly supported by Audited Balance Sheet duly certified by the Chartered Accountant.

SEAL AND SIGNATURE OF THE BIDDER

Certified that all figures and facts submitted in this form have been furnished after full consideration of all observations/notes in Auditor’s reports. _____

(Signature of Chartered Accountant)

Name of CA: _____

Registration No: _____

(Seal)

ANNEXURE-V(A)

Reference -Para 6.1 of ITT

(This certificate is to be given by attorney/authorized signatory/each member of Partnership firm/Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc.)

I/We.....(Name), attorney/authorized signatory of the(constituent firm / constituent partner) and member/partner of the(tendering firm) hereby solemnly affirm and state as under:

1. I/we certify that.....(Constituent firm/constituent partner) is/are not blacklisted or debarred by Railways or any other Ministry/ Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm LLP/JV/Society/Trust.
2. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or, if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered (evidence of valid registration by the competent authority is enclosed),

SEAL AND SIGNATURE
OF THE CONSTITUENT FIRM/CONSTITUENT PARTNER

Place :

Dated :

-----End of the document---