

WESTERN RAILWAY - ELECTRICAL POWER DEPARTMENT					
SCHEDULE OF APPROXIMATE QUANTITY AND RATES					
Name of work: Santacruz - Virar section - Electrical (Power) work in connection with provision of cover shed of left-over at VR, NSP, BSR, MIRA, BVI, KILE, GMN, RMAR, JOS, ADH, VLP & STC.					
Sr. No.	Item Description	Quantity	Rate (Rs.)	Unit	Amount (Rs.)
1	Supply of material and providing light/fan point wiring in PVC casing capping / PVC conduit, as per site requirement, with single core multi-strand copper wires, PVC insulated unsheathed, LSHF / ZHFR, of size 1.5 sq.mm. with set of 3 wires for phase, neutral & earth and modular switches, complete with all accessories, junction box, ceiling rose etc, as per specifications in Annexure I.	200	358	No.	71,600
2	Supply of material and providing main/ submain wiring, in PVC casing capping / PVC conduit, as per site requirement, with single core multi-strand copper wires, PVC insulated unsheathed, LSHF / ZHFR, of size 4.0 sq.mm. with set of 3 wires for phase, neutral & earth wire, as per specifications in Annexure II.	1000	120	R. Mtr.	1,20,000
3	Supply, fixing, testing & commissioning of modular power socket 3 pin twin heavy duty of 6/16 A capacity with 20A one way modular switch having neon indicator, as per specifications in Annexure III.	200	295	No.	59,000
4	Supply, fixing & commissioning of MCB DB three phase with RCBO, I/C: - FP RCBO of 63Amp – 1No and O/G: SP MCB of 10-32 Amp – 12Nos., enclosure made of non metallic polycarbonate thermoplastic material, IP 65 weatherproof, as per specifications in Annexure IV.	12	9,290	No.	1,11,480
5	Supply of energy efficient BEE 5 star rated BLDC ceiling fan 1200mm (48") sweep, with down rod, and standard accessories, fan & regulator shall be compatible to work with various makes & models, as per specifications in Annexure V. (Minimum Warrantee - 2 years)	448	2,175	No.	9,74,400
6	Fixing & commissioning of ceiling fan on existing M.S. hook: 1. The fan shall be installed complete with accessories & safety device e.g down rod, blades, canopies, rubber insulator, split pin & nut bolt with spring washers. If required size and length of down rod is different than original OEM make, then down rod will be supplied by the Railway. 2. The fan shall be connected with the supply point (within 3 mtr distance) using PVC insulated & sheathed copper wire 03 core 1.5mm ² size, LSHF / ZHFR, conforming to IS 694/2010 or latest and ISI marked, in PVC pipe or as per site conditions, with proper workmanship. (The ceiling fans will be supplied by Railways, transportation to site will be done by the firm from Mumbai central).	448	52	No.	23,296
7	Supply, fixing, testing & commissioning of 5 step fan regulator electronic modular stepped type, compatible to work with various makes & models of BLDC ceiling fans: 1. Ceiling fan's electronic modular stepped type regulator shall be of minimum 100 watts capacity suitable to work on 230 volts single phase AC supply. 2. Regulator should be compatible to work with various makes & models of BLDC ceiling fans. 3. Stepped regulator shall be fixed on modular board & connected with ceiling fan's piano controlling switch, shall be suitable for flush mounting on switch board, necessary internal wiring is included in the scope of work.	448	300	No.	1,34,400
8	Supply,fixing, testing & commissioning of outdoor type LED tube light luminaires 40W maximum, 4 ft long, whether proof having IP 65/66 protection, System efficacy ≥ 110 lm/W, Lumen Output ≥ 4000 lumens, Colour consistency CRI ≥ 80 . Driver Surge protection $\geq 4KV$. Luminaire should have Class B serviceability (i.e., the driver can be replaced or maintained at site). IK 08 protection for durability. Luminaires complete with all accessories and other specifications as per Annexure VI. (Minimum Warrantee - 5 years)	964	3,779	No.	36,42,956

Sr. No.	Item Description	Quantity	Rate (Rs.)	Unit	Amount (Rs.)
9	Supply,fixing,testing & commissioning of LED flood light luminaire, 98W (100W maximum), whether proof having IP 66 protection, System efficacy \geq 120 lm/W, Lumen Output \geq 11700 lumens, Colour consistency CRI \geq 70, Driver Surge protection \geq 4KV, The luminaire should have a potted driver, mounted inside the luminaire. Luminaire should have Class B serviceability (i.e., the driver can be replaced or maintained at site). Luminaires complete with all accessories and other specifications as per Annexure VI. (Minimum Warrantee - 5 years)	24	10,031	No.	2,40,744
10	Survey, design, manufacture, display of wall / hanging / floor mounting type LED illuminated sign / direction boards in half elliptical shape. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2 mm thickness. The text / graphics matter visibility shall not be less than 160 deg. The approved colour text and graphics shall be printed / router cut on monomeric calendered vinyl of 70 μ M thickness and shall be firmly pasted on display sheets. The mounting arrangement shall be hanging, wall mounting, ceiling mounting, pole mounting or floor mounting and as per site requirement. The signage shall have the integral mounting arrangements with sturdy structural frame and ACP cladding on the back side of the signage to avoid rusting and entry of dust. The LED board shall have uniform illumination with 4-8 W / sq. ft and with brightness more than ambient light. Suitable size end cap of 1.5 mm thick SS 304 should be provided. The unit rate in the schedule is for single sided board. In case of double sided boards, the quantity will be counted as 1.3 times of the schedule quantity. Details as per specifications in Annexure VII.	1,008	2,184	Sq. Ft.	22,01,472
11	Erection and installation of wall / hanging / floor mounting type LED illuminated sign / direction boards in half elliptical shape. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2 mm thickness. The text / graphics matter visibility shall not be less than 160 deg. The approved colour text and graphics shall be printed / router cut on monomeric calendered vinyl of 70 μ M thickness and shall be firmly pasted on display sheets. The mounting arrangement shall be hanging, wall mounting, ceiling mounting, pole mounting or floor mounting and as per site requirement. The signage shall have the integral mounting arrangements with sturdy structural frame and ACP cladding on the back side of the signage to avoid rusting and entry of dust. The LED board shall have uniform illumination with 4-8 W / sq. ft and with brightness more than ambient light. Suitable size end cap of 1.5 mm thick SS 304 should be provided. The unit rate in the schedule is for single sided board. In case of double sided boards, the quantity will be counted as 1.3 times of the schedule quantity. Details as per corresponding specifications in Annexure VII.	1,008	217	Sq. Ft.	2,18,736
12	Supply, fixing, testing and commissioning of Auto Transfer Switch of 4 pole, 3 phase, 200A capacity in ms encloser, complete with all accessories as per specifications in Annexure VIII.	6	59,796	No.	3,58,776
13	Supply, fixing, testing and commissioning of 125A, 4 pole electronic / microprocessor based MCCB, with inbuilt earth fault protection along with earth leakage protection having shunt coil, earth leakage relay 30mA -30A CBCT etc., in sheet steel enclosure, as per specifications in Annexure IX.	6	54,378	No.	3,26,268
14	Supply of XLPE insulated, PVC sheathed, armoured 1.1 KV grade, multi-stranded aluminum conductor cable of size 50 sq.mm.x 4 core, as per specifications in Annexure X.	500	266	Mtr.	1,33,000

Sr. No.	Item Description	Quantity	Rate (Rs.)	Unit	Amount (Rs.)
15	Supply of XLPE insulated, PVC sheathed, armoured 1.1 KV grade, multi-stranded copper conductor cable of size 16 mm ² x 4 core, as per specifications in Annexure X.	1,000	1,381	Mtr.	13,81,000
16	Supply, fixing, testing & commissioning of cable jointing kit for aluminium conductor XLPE insulated PVC sheathed, armoured cable of size 50 sq.mm. 4 core, as per specifications in Annexure XI.	3	8,021	No.	24,063
17	Supply and fixing of flange type cable glands made of out of brass castings, outdoor type suitable for armoured cables, gland size above 25 mm and upto 38 mm dia., as per specifications in Annexure XII.	24	390	No.	9,360
18	Excavation of the cable trench in normal soil under rail/ road and refilling back the excavated earth, restoring /repairing of flooring after lying of cable, as per specifications in Annexure XIII.	700	107	Mtr.	74,900
19	Excavation of the cable trench in hard soil under rail/ road/rocky soil / platforms (stone/RCC/Rock) and refilling back the excavated earth, recasting of flooring after lying of cable, as per specifications in Annexure XIV.	300	744	Mtr.	2,23,200
20	Removing of old/ defective/ unused PVC insulated and armoured cables of different sizes upto 120 sq.mm., as per specifications in Annexure XV.	2,000	13	Mtr.	26,000
21	Supply, fixing, testing & commissioning of colour coded 6 Nos x 25 sq.mm size hard drawn solid aluminium aerial wires with nominal PVC insulation of 1.2mm, including 8 SWG earthing wire, M.S. clamps / bracket with shackle insulators at end points for drawing the aerial cables & M.S clamps/ brackets with bobbin insulators at middle points for supporting the aerial wires, as per specifications in Annexure XVI.	2,698	535	R.Mtr.	14,43,430
22	Supply of material and providing power supply connections to lights/ fans, with PVC insulated & sheathed, LSHF / ZHFR flexible multi strand copper cable of size 1.0 sq.mm. X 3 core, upto 3 meter length, in PVC conduit pipe for laying & protection including cable ties for fastening, connection of light/ fans, as per specifications in Annexure XVII.	1,349	243	No.	3,27,807
23	Supply and fixing of GRP / FRP cable tray, RED in colour, made of glass fiber reinforced polyester moulding composite material, size 200mm width x 75mm depth min., 04mm thick min., including horizontal and vertical reducers, tees, cross members and other accessories as required and duly suspended from the ceiling with GI suspenders etc., as per specifications in Annexure XVIII.	500	725	Mtr.	3,62,500
24	Supply, fixing, testing and commissioning of bus duct trunking system of 40A (4+2) conductors, 3ph, 4 wire, IP55 with center feed unit, 16A lap off box, plug outlet covers, 16A 1ph selection plugs suitable for glass fuse, ceiling bracket holder, suspension clamp, wall bracket, suspension hook, snap clamp etc. All suspension accessories shall be either galvanized or powder coated, as per specifications in Annexure XIX.	500	2,975	Mtr.	14,87,500
25	Supply, fixing, testing and commissioning of plug in box/ tap off box of bus duct trunking system with connecting wire of 3 core x 1.0 sq.mm. in PVC conduit to complete the wiring connection to light/ fans, including all material required for fixing arrangement, as per specifications in Annexure XX.	250	547	No.	1,36,750
26	Supply, fixing, testing and commissioning of flexible bend of 40A (4+2) conductors for bus duct trunking system, 3ph, 4 wire, IP55, including all necessary components for connecting two ends of bus trunking, as per specifications in Annexure XXI.	20	9,920	No.	1,98,400
27	Supply, installation, testing & commissioning of digital astronomical daily time switch as per Legrand DX3/ AlphaRex3 or similar, with 25A 4NO contactor as per Legrand cat. No. 4125 51 or similar & 06 module cabinet IP65 as per Legrand cat.No. 6019 96 or similar, complete with internal wiring & connections, fixing arrangement, as per specifications in Annexure XXII.	12	5,638	No.	67,656

Sr. No.	Item Description	Quantity	Rate (Rs.)	Unit	Amount (Rs.)
28	Supply of material & installation of maintenance free earth electrode of length 3 meter, including earth enhancement material for earthing for each electrode & other accessories as per Drg. No. SDO/ RDSO/ E&B/001 and RDSO Spec No. RDSO/SPN/197 /2008, as per Annexure XXIII.	12	10,899	No.	1,30,788
29	Supply, fixing, testing & commissioning of G.I. strip 25mm x 6mm for earthing, including cutting, bending, welding, excavation etc., as per specifications in Annexure XXIV.	120	106	Mtr.	12,720
30	Supply, laying, testing, fixing and commissioning of PVC insulated & PVC sheathed, multi-stranded, 1.1 KV grade, copper conductor cable of size 16 sq.mm. single core FRLS, in flexible / rigid PVC conduit, complete with clamping of the cables, and lugs at each connection, as per specifications in Annexure XXV.	1,000	294	Mtr.	2,94,000
GRAND TOTAL (Rs.) =					1,48,16,202

A. NOTE -

- The above rates shall be firm, inclusive of all taxes, GST, duties, freight and other incidental charges, as applicable. GST will be paid as per prevailing rate at the time of billing on submission of documentary evidence.
- However, for evaluation of bid, the rate for GST shall be considered as per the GST Act, as applicable as on date of tender closing, irrespective of the rate quoted by the bidder for GST.
- All the bidders/tenderers should ensure that they are GST compliant and their quoted tax structure/ rates are as per GST Law.
- The tenderer shall quote percentage the above or at par or below of the schedule.
- Tenderers are advised not to quote individual item wise rates.
- The price shall be commercially firm and without any ambiguity. Offer with any sort of ambiguity or incomplete offer will be summarily rejected.
- The quantities shown in the above schedule are approximate and are as a guide to give the tenderer(s) an idea of quantum of work involved.
- The Railway reserves the right to increase/decrease and /or delete or include any of the quantities given above as per the requirement of work.
- Items details shall be read in conjunction with Shchedule, Specifications, Special Conditions of Contract, Explanatory Notes of tender.
- Supply & Erection rate shall cover the entire cost of incidental transport lead & lift.
- Price variation is not admissible under any circumstances.

B. Definition of Similar Nature of Work for Electrical Power Department:

"Wiring/ Re-wiring in buildings with associated electrical works like control gear and protection arrangements in residential buildings or service buildings or railway stations / yards or colony/ highway lightings. OR Lighting arrangement in buildings, circulating area, yard, street etc. with associated electrical works. OR Wiring/ Rewiring, Lighting arrangement in buildings with associated electrical works."

- C. i) Electrical Contractor License:** *The contractor himself or the Sub-Contractor appointed by him must have valid Electrical Contractor's License issued by any State Government in their own name or in the name of the firm, as per IE Rule 1956 clause No. 45 or as amended from time to time. The Contractor or the Sub-Contractor appointed by him shall possess valid License throughout the currency of the contract. The contractor shall ensure timely renewal of license.*

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

Note: for subletting of work costing up to Rs 50 lakh, no previous work experience of subcontractor is required.

D. Payment Terms -

i) On account Payment shall be made for the work carried out against supply, installation, testing and commissioning of individual item of schedule, on submission of contractor's bill and due certification by the Railway's concerned Electrical Engineer in Charge.

ii) Tax invoice for major items like wires, cables, MCBs, switchgears, lights, fans, bus duct trunking system etc. from OEM/ OEM's authorized dealer shall be submitted by the firm along with the bills.

SPECIFICATIONS

Name of work: Santacruz - Virar section - Electrical (Power) work in connection with provision of cover shed of left-over at VR, NSP, BSR, MIRA, BVI, KILE, GMN, RMAR, JOS, ADH, VLP & STC.

Scope of work –

1. Scope of work covers provision of electrical power, lighting arrangements like wiring, MCB DBs, LED lights, fans, cable work, earthings, bus duct trunking system & other related works in connection with provision of cover shed of left-over at Santacruz, Vileparle, Andheri, Jogeshwari, Rammandir, Goregaon, Kandivali, Borivali, Mira Road, Vasai Road, Nalasopara, Virar stations.

It includes supply, installation, testing and commissioning of new electrical items mentioned in the tender schedule at site as per technical specifications. Materials used on the job shall be new and samples got approved by the Engineer-in-charge.

2. Scope of the work also includes ms bracket arrangement for installation of luminaires, junction boxes, cable glands, lugging, wiring connections to the lights, fans, equipments & other related works at site as per requirement.

3. COMPOSITE TENDER OF CIVIL AND ELECTRICAL WORKS:

- i) The contractor himself or the Sub-Contractor appointed by him, the detail of which should be furnished in the tender by the main tenderer, shall have valid Electrical Contractor License for carrying out electrical works. During course of execution, if Contractor proposes for change of Sub-Contractor, prior approval shall be taken from Electrical Department.
- ii) The execution of electrical work will be under the supervision of Electrical Department and the measurement for the same shall be made separately through their own measurement book.
- iii) The final payment will be released by the Engineering Department only after receiving NOC from the Electrical Department for satisfactory completion of electrical portion of work.
- iv) **Electrical Contractor License:** The contractor himself or the Sub-Contractor appointed by him must have valid Electrical Contractor's License issued by any State Government in their own name or in the name of the firm, as per IE Rule 1956 clause No. 45 or as amended from time to time. The Contractor or the Sub-Contractor appointed by him shall possess valid License throughout the currency of the contract. The contractor shall ensure timely renewal of license.
- v) **Subcontractor for Electrical Power work:** The subcontractor shall have successfully completed at least one work similar to work proposed for subcontract, costing not less than 35% value of work to be sublated, in last 5 years, ending last day of month previous to the one in which tender is invited through a works contract.

Note: for subletting of work costing up to Rs 50 lakh, no previous work experience of subcontractor is required.

4. All the materials, equipments, its accessories shall be conforming to the industry standards, and in accordance with the specifications of the OEM, confirming to relevant IS only. Relevant standards shall be followed in carrying out the work, and the decision of department shall be final and binding.
5. All the materials required for this work shall be inspected by Railways authorized Engineer representative/ **RITES (RITES inspection if material accepted cost is more than 5 lakhs)**. Firm will submit manufactures original test certificate also. Inspection charges for RITES inspection will be borne by Railways.
6. The unit prices indicated in the Schedule of quantity is inclusive of the prices for design, manufacturing, supplying of materials, multiple loading/ unloading required under the particular item of schedule, storing, handling, erection testing and commissioning of installation in conformity of specification. The unit price is also inclusive of all incidental charges for transport, loading/unloading and handling of materials, commission for arranging dispatch direct from manufacturer's factory / authorized dealer / supplier and

completing all necessary formalities in this respect, such as submission of forwarding notes, all insurance premium, bankers charges for bank guarantee, indemnity bonds inclusive of cost of stamps, etc. The unit prices shall include all incidental charges duties and levies including GST.

7. During the course of execution of above work electrical fitting, fixtures, wirings etc. needs to be removed and dismantled, shall be done by the contractor and released material shall be transported to store / scrap depot by the contractor for that no extra payment will be done. Any temporary bypass arrangement for continuity of supply if required shall also be done by the contractor under guidance of consignee.
8. Work is to be executed in co-ordination with Civil Engineering Dept. and other concerned departments. It is to be carried out with utmost care to avoid any disturbance to the railway operations, station activities or inconvenience to the occupants / users/ passengers.
9. The work shall be carried out under the supervision and guidance of concerned Sr. Section Engineer (SSE), Authorized by Sr. DEE / Power / Mumbai Central.
10. SSE will obtain permission for shut down to carry out the work, if required, hence the work may require to be carried out during night hours or on holidays in order to minimize the inconvenience to Railway working.
11. Proposed station/ location is tentative, which may vary at the time of execution of the work, considering various aspects like feasibility and utility.
12. Quantity shown in the schedule is approximate and subject to vary at the time of execution of work and will depend upon actual requirement at site.
13. Released materials/ scraps to be properly accounted & handed over to the Railway with proper record.
14. GUARANTEE/WARRANTY: The materials supplied / required shall be covered with Guarantee / Warrantee for a period of minimum one year or as specified otherwise. During the Guarantee / Warrantee period all defective units/ equipments/parts should be repaired or replaced at free of cost, including labour, transportation etc. and also including removing/ dismantling from the site and after repairing/ replacement of defective item, re-fixing & commissioning of it at the site.
15. Any work / item/ part thereof, whether specially mentioned in the scope of work or not, but necessary for completion of the work and for proper functioning and commissioning of the equipment shall be deemed to be the part of the scope of work. It should be clearly understood, that the work assigned as per the tender documents is a complete turnkey job and complete execution thereof will be the entire responsibility of the successful tenderer unless otherwise specially brought out in the contract agreement and/or the letter of acceptance of the offer.
16. The successful contractor shall arrange all equipment, tools, consumables, testing meters/ instruments, ladders, hoist, scaffolding, crane, forklift etc. and tools & tackles, other required materials for successful completion of the work. Any work not specifically mentioned, but required for successful completion of work is deemed to be included in the work.
17. The specifications as referred as standard specifications and technical specifications are expected to be known to the working contractors of the concerned field, however the standard specifications are widely available and specific to the work are enclosed as far as possible. Tenderer should make all the efforts to make fully aware of the scope of work, standard & technical specifications as may be required for satisfactory commissioning of the work.
18. It is not the intent to specify herein complete details of design and construction. The equipment offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements.
19. The successful contractor shall arrange all equipment, tools, consumables, testing meters/ instruments, ladders, hoist, scaffolding, crane, forklift etc. and tools & tackles, other required materials for successful

completion of the work. Any work not specifically mentioned, but required for successful completion of work is deemed to be included in the work.

20. **TESTING & COMMISSIONING:** As specified in technical specification of the item/ equipment: The Contractor shall organize testing and commissioning of installation/equipments and components as decided by engineer's representative and the same shall be witnessed by engineer's representative. The contractor shall arrange all pre commissioning routine/ acceptance and other reasonable tests at his cost with a view to ensure the soundness of the equipments and their erection in strict compliance with the specifications.
21. **Rejection of Materials:** Any material including that required for electrical works or articles, fitting etc. and delivered to the site of work, which the Engineer-In-Charge shall find to be unsuitable or of a specification or description inferior in his opinion to that required for the purpose of work shall not be used thereon, but shall be removed by the contractor at his own cost from the site of work within 24 hours of notice to that effect issued in writing by the Engineer-In-Charge or his representative
22. In addition to supply, installation, testing and commissioning of all equipments as per schedule and specifications of work, following works are deemed to be within the scope of work, to be executed by the contractor.
 - (i) Removal of old electrical arrangements / equipment, necessary to carry out the proposed work. Any minor modification / changes in the existing system / arrangement, with fabrication / drilling or any other means, at site.
 - (ii) All minor building works, such as equipments foundation if required, cutting and making good holes, grouting of channels belts as required. Cutting and making good damages etc.
 - (iii) Provision of supports / clamps for equipments, cables etc. wherever required.
 - (iv) Small wiring, inter-connection etc. inclusive of all materials and accessories, necessary to comply with the regulations as well as proper and trouble free operation of the equipment.
 - (v) Closing of the cable entry points against seepage of water, rodents etc.
 - (vi) Tools and tackles required for handling and installation.
 - (vii) Necessary testing of equipments for commissioning.
 - (viii) Watch and Ward of materials and/or installation and equipments till their handing over to the Railway.
23. **Safety of the staff:** Safety of the contractor's men engaged in the work will solemnly be the responsibility of the contractor and therefore careful supervision is required during the work to guard and warn his men against unusual incident / electrical shock / moving trains / live OHE lines, etc. The contractor shall make adequate arrangements during the construction period for the safety of workers.
24. **CARE OF THE BUILDING** -Care shall be taken by the contractor during execution of the work to avoid damage to the building. He shall be responsible for repairing all such damages and restoring the same to the original finish at his cost. He shall also remove all unwanted and waste materials arising out of the installation from the site of work from time to time.
25. **CONFORMITY WITH STATUTORY ACTS, RULES, STANDARDS AND CODES** - All components shall conform to relevant Indian Standard Specifications, wherever existing, amended to date. All works shall conform to National Building code as well as relevant BIS codes.
26. All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 2003 and Indian Electricity Rules, 1956 amended to date. All components shall conform to Energy Conservation Building Code 2007 of India as amended or revised up to date.
27. The material supplied and to be used for this contract work shall be strictly conform to relevant ISS Nos. and also as per the approved brands. In addition, the work shall confirm in the technical specification/ scope of work specified by railway tender document.
28. All the safety codes and procedures outlined in the safety codes shall be complied with. General and safety requirements shall be governed by IS:13947(Pt-I)1993 and IS:8623/1993, amended to date.

29. The wiring shall be carried out as per Indian Standard color code viz: Phase wire - Red (for single phase), Yellow & Blue, Neutral wire - Black and Earth wire - Green color only
30. Switches controlling lights, fans or socket outlets shall be connected in the phase wire of the final sub circuit only. Switches shall never be connected in the neutral wire. No joint of any nature whatsoever shall be permitted in wiring. Joints shall be made only at distribution board terminals, switches and at ceiling roses/connectors/lamp holders terminals for lights/fans/socket outlets.
31. Neutral conductor (incoming & outgoing) shall be connected to a neutral connector link in boards and capable of being disconnected individually for testing purposes. In no case joints in phase & neutral wires is allowed.
32. The Contractor may use electrical power supply for the purpose of drilling, welding etc. during the execution of work after paying the necessary charges.
33. **Identity cards:** All the staff deputed by the Contractor shall carry identity card with them all the time while present in the railway premises in connection with the work awarded. The identity card having passport size photograph, shall be issued by the contractor at his own cost, countersigned by concerned Railway Authority and the Contractor, with validity of 6 months or as advised by the railway representative.
34. **Inspection of material: -**

All the material, erection and installation 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:

- i) **Inspection of the materials** having accepted cost **more than Rs. 5 lakhs** will be carried out by **RITES/ RDSO/ authorized & approved testing agency** at the Manufacturer's premises prior to dispatch in presence of contractor's representative.

All the materials/equipment to be supplied shall confirm to the relevant specification only. All tests will be carried out as per the relevant standards.

The inspection charges, if any, shall be reimbursed by the Railway on production of documentary evidence from RITES/RDSO/ authorized & approved testing agency as demanded by the Engineer

- ii) **After Receipt of material:-** Inspection of all the items shall be done at depot / site by Consignee/ Authorized Railway Representative. Contractor shall produce all the test reports, material documents in original etc. during inspection.

All the defects / discrepancies, if any, pointed out during inspection should be attended by the contractor immediately.

- iii) **Stage Inspections :** - Stage inspections shall be carried out by Consignee/ Authorized Railway 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.
- iv) **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.

SPECIFICATIONS:

Anne x.	Schedule Item Description	Unit	Details Technical Specifications
I	Supply of material & providing light/fan point wiring in PVC casing capping / PVC conduit, as per site requirement, with single core multi-strand copper wire, PVC insulated unsheathed, LSHF / ZHFR, of size 1.5 sq.mm., for phase, neutral & earth wire, and modular switches, complete with all accessories, junction box, ceiling rose etc.	No.	<ol style="list-style-type: none">1. The light/fan point wiring in PVC casing capping / PVC conduit for phase, neutral & earth wire shall be made of Class 2 stranded shaped conductor, with PVC insulated unsheathed, low smoke halogen free / zero halogen flame retardant wires, 1100 volt grade confirming to IS: 694 of 2010 or latest / IEC / NEC / NFPA Standards and ISI marked.2. The firm shall submit relevant type test certificates from NABL approved lab to confirm LSHF / ZHFR wires.3. Size of wire - Single core, 1.5 sq. mm. Material - Multi strand copper conductor.4. The wiring shall be confirming to the IS 732:1989 Code of practice for electrical wiring installations (third revision Reaffirm March 2010), with latest amendment.5. Type of wiring may be PVC casing capping / PVC conduit, depending upon the specific site requirement. Type of wiring and its quantity shall be decided by the consignee as per requirement.6. Wiring with PVC casing capping –<ol style="list-style-type: none">(i) The wiring shall be in white/ivory PVC casing capping conforming to IS: 14927, with ISI marked. The size of casing capping to be proportionate to the number & size of wire to be drawn using minimum size 25mm \pm0.2mm.(ii) All the dimensions and thickness of PVC casing capping shall be as per IS 14927 (Part I & 2), with wall thickness at least 1.2 mm thick.7. Wiring with PVC conduit -<ol style="list-style-type: none">(i) The wiring shall be made with uPVC conduit pipes of minimum 20mm dia. plumber grade, complete with all accessories, PVC clamps etc. The size of the pipe shall be increased as the number of wires increased.(ii) The pipe shall be rigid, heavy duty uPVC round pipe with properties of anti-corrosive, dust-proof, rust-proof, shock-proof, high-strength, weather proof, fire retardant, non conductive, homogeneous, free from visible cracks, holes or foreign inclusions, maintenance free & durable.(iii) Rigid PVC conduit pipes having marking 'heavy' / 'HMS' (heavy mechanical stresses) and 'ISI' shall be used. PVC conduit pipes shall be conforming to IS: 9537 (Part III) and all PVC accessories shall be conforming to IS: 3419.(iv) All the dimensions and thickness of PVC conduit shall be conforming to relevant IS, with thickness of pipe at least 2 mm thick.8. The wiring shall be complete with 10A modular type switches for controlling, ceiling rose angular/batten holder, PVC accessories i.e. square box, sockets, Corner & Tees etc.9. Switches, lamp holder, ceiling rose etc. shall be conforming to IS 3854 of 1997 and IS 1258 of 2005, IS 371 of 1999 with latest amended. The modular 10A one way switch shall be as per Roma's cat No. 21011 or equivalent of approved make with ISI mark. Switches shall be suitable and compatible for fixing in the modular boxes of any make.10. The wiring shall be carried out as per Indian standard color code viz:

			<p>phase wire-red, neutral-black and earth-green color only.</p> <p>11. Measurement: The point wiring shall be measured on unit basis by counting. However, the distance from respective tapping point of live cable, namely switch board and outlet point of any load shall be on an average not more than 07 mtrs. If in any case, such distance is more than 07 mtrs, then the point will be treated as long point and point units will be considered in this scenario in the following manner</p> <table><tr><td>If the linear distance between switch board and respective load point is less than or equal to 07 mtrs</td><td>1 point</td></tr><tr><td>For every 04 mtrs or part thereof, beyond 07 mtrs linear distance between switch board and respective load point</td><td>0.5 point each</td></tr></table> <p>12. Make of all above accessories shall be as per enclosed list of acceptable makes and as per sample approved.</p>	If the linear distance between switch board and respective load point is less than or equal to 07 mtrs	1 point	For every 04 mtrs or part thereof, beyond 07 mtrs linear distance between switch board and respective load point	0.5 point each
If the linear distance between switch board and respective load point is less than or equal to 07 mtrs	1 point						
For every 04 mtrs or part thereof, beyond 07 mtrs linear distance between switch board and respective load point	0.5 point each						
II	Supply of material and providing submain and power point wiring in PVC casing capping / PVC conduit, as per site requirement, with single core multi-strand copper wire, PVC insulated unsheathed, LSHF / ZHFR, of size 4.0 sq.mm. for phase, neutral & earth wire.	R. Mtr.	<p>1. Main/ submain and power point wiring shall mean the wiring from one main / distribution switch board to another.</p> <p>2. The main/ submain in PVC casing capping / PVC conduit wiring for phase, neutral & earth wire shall be made of Class 2 stranded shaped conductor, with PVC insulated unsheathed, low smoke halogen free / zero halogen flame retardant wires, 1100 volt grade confirming to IS: 694 of 2010 or latest / IEC / NEC / NFPA Standards and ISI marked.</p> <p>3. The firm shall submit relevant type test certificates from NABL approved lab to confirm LSHF / ZHFR wires.</p> <p>4. Size of wire - Single core, 4.0sq.mm. Material - Multi strand copper conductor.</p> <p>5. The wiring shall be confirming to the IS 732:1989 Code of practice for electrical wiring installations (third revision Reaffirm March 2010), with latest amendment.</p> <p>6. Submain wiring shall be measured on <u>linear basis (i.e. Single wire length basis)</u> along the run of the wiring.</p> <p>7. Type of wiring may be PVC casing capping / PVC conduit, depending upon the specific site requirement. Type of wiring, size and its quantity for the particular type of wiring shall be decided by the consignee as per requirement.</p> <p>8. Wiring with PVC casing capping –</p> <p>(i) The wiring shall be in white/ivory PVC casing capping conforming to IS: 14927, with ISI marked. The size of casing capping to be proportionate to the number & size of wire to be drawn using minimum size 25mm ±0.2mm.</p> <p>(ii) All the dimensions and thickness of PVC casing capping shall be as per IS 14927 (Part I & 2), with wall thickness at least 1.2 mm thick.</p> <p>9. Wiring with PVC conduit -</p> <p>(i) The wiring shall be made with uPVC conduit pipes of minimum 20mm dia. plumber grade, complete with all accessories, PVC clamps etc. The size of the pipe shall be increased as the number of wires increased.</p> <p>(ii) The pipe shall be rigid, heavy duty uPVC round pipe with properties of anti-corrosive, dust-proof, rust-proof, shock-proof, high-strength, weather proof, fire retardant, non-conductive, homogeneous, free from visible cracks, holes or foreign inclusions, maintenance free & durable.</p>				

			<p>(iii) Rigid PVC conduit pipes having marking 'heavy' / 'HMS' (heavy mechanical stresses) and 'ISI' shall be used. PVC conduit pipes shall be conforming to IS: 9537 (Part III) and all PVC accessories shall be conforming to IS: 3419.</p> <p>(iv) All the dimensions and thickness of PVC conduit shall be conforming to relevant IS, with thickness of pipe at least 2 mm thick.</p> <p>10. The wiring shall be carried out as per Indian standard color code viz: phase wire-red, neutral-black and earth-green color only.</p> <p>11. Make of all above accessories shall be as per enclosed list of acceptable makes.</p>
III	Supply, fixing, testing & commissioning of modular power socket 3 pin twin heavy duty of 6/16 A capacity with 20A one way modular switch having neon indicator.	No.	<p>1. Modular twin socket 6/16A, 3 pin two module shall be conforming to IS / BIS standard IS 1293 of 2019 with latest amended, ISI marked. Modular switch 20A one way single module having neon indicator shall be conforming to IS / BIS standard IS 3854 of 1997 with latest amended, ISI marked.</p> <p>2. Socket with safety shutter & switch shall be of unbreakable engineering plastic/ polycarbonate/ polypropylene material, with heavy duty screw type brass terminals.</p> <p>3. The socket with switch shall be fixed in modular box.</p> <p>4. The box shall be internally wired with LSHF / ZHFR PVC insulated unsheathed wire of size single core, 4.0 sq.mm., multi strand copper conductor, 1100 volt grade confirming to IS: 694 of 2010 or latest / IEC / NEC / NFPA Standards and ISI marked.</p>
IV	Supply, fixing & commissioning of MCB DB three phase, I/C- 4P RCBO 63Amp – 1No. and O/G: SP MCB of 10A-32A – 12Nos, of capacity as per site requirement, enclosure made of non-metallic polycarbonate thermoplastic material, IP 65 weatherproof.	No.	<p>1. The MCB distribution board shall be of non-metallic thermoplastic polycarbonate material with internally embedded polyurethane gasket, confirming to suitable standards i.e. IS 13032/1991, IS 8623-1 & 3, IEC 61439 - 1 & 3 & suitable for the Three-phase supply system.</p> <p>2. The board shall be weatherproof with IP 65 min., Impact strength IK08 min., self-extinguishing class II insulating material, fire/flame retardant, environment friendly, nontoxic & safe.</p> <p>3. The board shall be including neutral & earth terminals, pre-molded knockouts & cable glands at top & bottom, DIN rail, blanking strips for unused openings, with transparent or opaque doors lockable type. Screws used shall be made of stainless steel.</p> <p>4. The board shall have the following arrangement. All MCBs, RCCB etc. shall be of same make and ISI marked.</p> <p>5. MCBs shall be conforming to IS 8828-1996 / IEC 60898-1-2002, ISI / CE Marked, B Curve, 6KA breaking capacity, IP 20 protected terminals.</p> <p>6. RCBOs shall be ISI/CE marked, and shall conform to IEC / EN 61009, IS 12640-2, Rated sensitivity - 30mA, IP 20 protected terminals.</p> <p><u>Incoming:</u> Four pole RCBO of 63 Amp – 1 No.</p> <p><u>Outgoing:</u> Single pole MCB of 10-32 Amp – 12 Nos. (4 Nos. each of 10A, 20A and 32A MCBs or as per site requirement).</p> <p><u>Busbar:</u> The busbars shall be of copper strips of suitable size and rating for phase and neutral connections.</p> <p><u>General:</u></p> <p>1. The board shall be internally wired with LSHF / ZHFR PVC insulated & sheathed multi strand copper conductor of adequate size and capacity conforming to IS-694 of 2010 or latest and ISI marked.</p> <p>2. The connection shall be made with proper size of pin type crimping</p>

			<p>sockets and glands of Dowell's / Jainson make of shall be as per the size of the cable used.</p> <p>3. MCB box shall be fixed on the wall / pillar with suitable fixing arrangement as per site conditions and proper size and Nos. of GI screws/ nut bolts/ fasteners etc.</p> <p>4. Caution board shall be provided as per IS 2551/1982.</p> <p>5. The distribution board shall be provided with rubber gasket and knockouts as per requirement.</p>
V	Supply of ceiling fan 1200 sweep (48") with 3 blades, energy saver, 5 star rated brushless DC (BLDC) motor with down rod. (2 years warrantee)	No.	<p>1. Specifications of energy efficient brushless DC (BLDC) motor ceiling fans: Fan confirming to IS:374/2019, Sweep size 1200 mm, Rated Voltage - 230V, 50 Hz AC supply, Copper winding, Rated Power – up to 30W, Power Factor > 0.9 Minimum Air Delivery – 210 Cubic Meter / Min. Service Value > 7, BEE Star Rating – 5 star or above. Class of Insulation – B, Insulation Resistance > 2 Mega Ohm, Fan & regulator shall be compatible to work with various makes & models. No. of Blades – 03 Nos. Blade Material – Aluminium, Bearings – Double ball bearings, Down Rod size – 300 mm (without shackle) , Shank & shackle kit, Canopy – 2 Nos., and all accessories including safety pin, nut, bolts, washers, earthing etc. Colour – Standard white, Warrantee – 2 years (minimum)</p> <p>2. The firm has to submit type test report from Government accredited test labs like NABL/CPRI etc.</p>

Annexure – VI.

Technical Specifications of LED & LED fittings (Indoor & Outdoor type)

(A) SCOPE:

- The scope includes design, development, manufacturing, testing and supply, installation, testing and commissioning of energy efficient LED luminaires complete with all accessories, LED lamps with suitable current control driver circuit including mounting arrangement.
- The firm shall supply the LED luminaires as per type, capacity and quantity mentioned in the tender schedule, and having following specifications.

(B) Common Specifications -

Sr. No.	Description of Parts	Specification
01	Housing (Indoor fittings)	<p>1) Housing shall be made of 1 mm or more thick sheet Steel confirming to IS 513 (Grade 0) or polycarbonate / CRCA powder coating / aluminum body.</p> <p>2) The entire housing shall be having IP 20 protection for indoor application as per IEC 60529.</p>
02	Front cover (Indoor fittings)	<p>1) All indoor light fittings shall be provided with polycarbonate / high efficiency Lumio diffuser, of sufficient strength.</p>

03	Housing (Outdoor fittings)	<ol style="list-style-type: none"> 1) Housing shall be made of 1.6mm or more thick sheet Steel confirming to IS 513 (Grade 0) or aluminum die cast having high conductivity preferably to grade 5000 or similar to high conductivity heat sink material, with corrosion resistant powder coating. 2) The entire housing shall be dust and water proof having minimum IP 65 protection for outdoor application as per IEC 60529. 3) Housing of weather proof fittings for platform coversheds may be of aluminum/ polycarbonate/ FRP, with effective thermal management, sturdiness.
04	Front cover (Outdoor fittings)	<ol style="list-style-type: none"> 1) Outdoor light fittings shall be provided with toughened glass of sufficient strength under the LED chamber to protect the LED & luminaries. 2) Cover for 40W & below light fittings /weather proof fittings may be of polycarbonate. 3) Minimum IK 07 protection for durability, unless otherwise specified.
05	Manufacturer's name / logo	<ol style="list-style-type: none"> 1) Manufacturer's name/ Brand name/ logo & major technical details shall be available on each fitting. 2) Outdoor luminaire shall have name of the manufacturer embossed on the luminaire. 3) Each fitting shall have a distinct marking so as to facilitate the traceability till the end of life.
06	LED lamp make	<ol style="list-style-type: none"> 1) LED lamps of NICHIA/ CREE/ OSRAM/ SEOUL/ PHILIPS LUMILEDS/ LEDNIUM/ AVAGO/ SAMSUNG make shall be used for the purpose. 2) This must be validated through LM-79 for the particular type of fitting.
07	LED lamp	<ol style="list-style-type: none"> 1) The working life of the LED lamp shall be more than 50,000 hours at L70, unless otherwise specified, and shall be suitable for continuous operation of 24 hours. 2) CCT (correlated color temperature) of the proposed white colour LED shall be between 5700K – 6500 K. 3) LED Tj / junction temperature shall not go beyond 80°C.
08	LED driver	<ol style="list-style-type: none"> 1) The driver card shall withstand 440V normal, driver shall be isolated type, constant current unless otherwise specified. 2) LED driver shall withstand voltage of 440V for 2 hours and restore normal working when normal voltage is applied. 3) Input voltage range within 140Vrms to 270Vrms. Operating input voltage 240Vrms. 4) Total Harmonic Distortion THD $\leq 10\%$ 5) Standard Deviation Colour Matching SDCM ≤ 5 (for retrofit LED Tube ≤ 6)
09	LED Luminaire	<ol style="list-style-type: none"> 1) Power factor of complete fitting shall be more than 0.95. 2) LED luminaire shall be free of glare. 3) Variation in illumination level shall be $\pm 2\%$ is allowed in input voltage range from 170V AC to 270VAC. 4) The control gear shall be designed in such a way so that temperature rise of heat sink shall not be more than 10°C with respect to ambient temperature. 5) The luminaire shall comply with the safety requirements as per IEC61195.
10	Efficacy (Lumen / Watt)	Each luminaires must be capable of delivering minimum lumens mentioned in the schedule and specifications below, along with other parameters for each type and capacity of luminaire.
11	Warranty	<ol style="list-style-type: none"> 1) Warranty of the Luminaire shall be five years, unless otherwise specified. 2) The Contractor/ supplier shall provide "In the field service support" during warranty period. 3) Security Deposit will be released after expiry of warranty period.
12	Certificates to be	<ol style="list-style-type: none"> 1) LM-79 and LM-80 test reports from a NABL/ UL accredited laboratory. 2) Luminaires & drivers should comply the relevant BIS/ IS/ IEC/ EMI/ CSIPR/ SELC

	submitted	<p>standards with latest amendments, wherever required e.g.</p> <ol style="list-style-type: none"> Fixture: BIS, IS10322 and IEC60598, EMC / EMI. The LED driver: BIS, IEC 61000-3-2 ed.3.2, 2009 for Harmonics, IEC61347 -2 -13, 2006 in Conjunction with IEC61347-1 ed.2.0, 2007 for Electrical Safety, IEC62384 ed.1.1, 2011 for performance and IEC61547 ed.2.0, 2009, CISPR-15 for EMI. Driver compliance: BIS, SELC (Safety Extra Low Voltage), Class 2 UL8750, Class II isolation. <ol style="list-style-type: none"> 3) Separate BIS certificates for driver and luminaire in case of Class B serviceability luminaires. 4) OEM's Test report/ certificates/ catalogs etc. 5) All certificates / reports to be arranged & submitted by the Contractor / Supplier to the Consignee for confirmation of different parameters.
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(C) General -

- A factory inspection, if asked by Railway authority, shall be arranged by the firm, and shall be carried out with the Consignee.
- A sample shall be got approved from the Railway authority.
- The fittings shall be connected with the supply point (within 3 mtr distance) using PVC insulated & sheathed copper wire 03 core 1.5mm² size, FRLS, conforming to IS 694/2010 or latest and ISI marked, in PVC pipe or as per site conditions, with proper workmanship.
- Light fitting shall be fixed with suitable size GI pipe, clamps, GI nut bolts / washers / chuck nut /screws, GI chain/ wire etc. & other accessories, required as per site conditions. GI pipes, clamps, chain etc. shall be painted with two coats of red oxide as primer and final two coats of silver paint.
- Confirmation of various parameters of specifications shall be applicable for LED fittings quantity of 50 nos. & above.
- For no. of fittings less than 50nos, the firm may submit OEM's documents / reports/ catalogs etc. for confirmation of parameters like type of LED Luminaire/ LED lamp make, wattage, Efficacy (Lumen / Watt), Warranty etc. by the consignee.
- Occupancy sensors in the luminaires / tubes, shall be intelligent movement/ occupancy detection sensors (DALI/ PIR/ microwave), suitable for the site application.
- Note: LED fittings such as decorative wall fittings, reading light / night light / foot light / spot light fittings, bubs/ lamps, down lighters, garden / Par lights / wall washer / customized fittings and other such type of LED fittings will not require compliance of these specifications and warrantee period of such fittings shall be one year only, unless otherwise specified. Confirmation of parameters like type of LED Luminaire/ LED lamp make, wattage, Efficacy (Lumen / Watt) etc. by the consignee.
- Operating temperature: 10°C to +55°C, Operating humidity: 10% - 90%.

Annexure – VII.

Glow sign boards and Signages –

- The contractor or his authorized agency should have experience in carrying out such type of work i.e. survey and design, manufacture, installation of LED illuminated sign / direction boards in elliptical / parabolic shape and having required infrastructure to carry out the work and testing facilities.
- The unit rate in the schedule is for single sided board. For double sided boards, the quantity will be counted as 1.3 times of the schedule quantity.

- iii) The firm shall survey the sites and design the schemes for wall / hanging / floor mounting type LED illuminated sign / directional boards / Signage for Services, Utilities, Caution, Direction and other importance, in elliptical shape. The firm shall submit design scheme reports for each station/ location in soft copy presentation. Any modification, suggestion for improvement in the scheme shall be done by the firm and shall be submitted for approval by the Railway's Competent Authority.
- iv) The price shall cover cost of design, manufacture, supply, loading, transportation and unloading to site, display, installation / erection, testing and commissioning of wall / hanging / floor mounting type LED illuminated sign / direction boards in Full Elliptical (FE), Half Elliptical (HE), Semi Elliptical (SE), parabolic shape as per site requirements.
- v) Elegant, aesthetically appealing energy efficient LED Elliptical signage for passenger amenities areas like platforms, direction, FOB's, Service buildings, Utilities, concourse etc. of the stations.
- vi) The work which is not included in the schedule but required to complete the installation work shall be considered as the part of work and carried out by the contractor accordingly and no extra payment will be paid for that.
- vii) It is recommended that the manufacturer of glow sign boards/ signage should have his own resources, including but not limited to skilled manpower, machinery (Thermoforming, Die Molding, Injection molding, extrusion capability) and materials to carry out the work in a timely and efficient manner. Failure to meet the specified timelines may result in penalties.
- viii) The bidder firm must mandatorily involve the design manufacturer of glow sign boards/ signage in the entire process of design and development of glow sign boards/ signage, site survey, signage customization, maintaining installation standards and procedures, and quality control.
- ix) The bidder must provide a detailed design/ pattern, drawings and schemes for the glow sign boards/ signage, which shall be similar to signage work done at Chhatrapati Shivaji Maharaj Terminus (CSMT) Mumbai of Central Railway/ Rani Kamalapati Railway Station (RKMP), Bhopal, or as desired by the Railway Authority.
- x) LED Elliptical Glow Sign Boards are to be provided in dust environment and open space and should have proper louvers or ventilation for dissipation of heat generated by drivers / LED's. However, the ventilation holes or louvers should be covered with wire mesh to prevent entry of insects or lizards.
- xi) The quality of the Vinyl/ Polycarbonate sheet/ anodized coating shall be covered under three years warranty from the manufacturer. LED's/ LED drivers shall be covered for free replacement five years warranty from the manufacturer.
- xii) Documentary proof of purchasing of LED/LED drivers/ Vinyl sheet/ Polycarbonate sheet from reputed approved brand/ its authorized dealers or certificate from the OEM in this regard shall be required to be submitted along with bill.
- xiii) Notwithstanding anything contained herein these guidelines, the signages shall be fully compliant with Divyangjan guidelines issued by Railway Board from time to time.

Technical Specifications:

The material for signages recommended shall be non- reflective matt finish. The surface shall be processed to prevent glare. The frame of the sign boards should be sturdy and corrosion resistant. The signages meant to be installed without any shelter or roof above should be designed as to prevent entry of water inside, even under heavy rains. Weatherproof polymer lining should be used.

1. Elliptical Illuminated Boards:

All the elliptical signage shall be illuminated. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2mm to 3mm thickness. The approved colour text and graphics shall be printed / router cut on monomeric calendered vinyl of 100 µm thickness and shall be firmly pasted on display sheets. The text / graphics matter visibility shall not be less than 160 deg.

The Top Profile of Elliptical Board shall preferably be made up of Aluminium Alloy (6063-T6) Extruded profile anodised to 15 µm +/- 3 µm. The profile nominal wall thickness shall be 2 mm. The reflective metallic silver PU particle coated granules shall be provided on the internal face of the profile. The edges of the profile shall be rounded. The profile shall have a suitable slot at an angle of 80-84 degree to firmly hold the polycarbonate sheet to its required shape.

Bottom, top and side Profile shall be made of the same material having 2mm to 5mm wall thickness.

The frame of elliptical boards shall be made of Extruded Anodised hollow aluminium profile of size not less than 1.2 mm thickness and anodized to minimum 15µm thickness (Grade AC-15) in approved colour. Anodizing coating shall be as per IS: 1868 or latest amendment.

End caps full / half with elliptical and parabolic shape shall be made from injection moulded polycarbonate granules 2 mm thick / SS 304 1.2 mm thick / Aluminium die casted 8 mm thick having curve on top side and internal hollow and elliptical base at bottom side with reflective internal surface. The End caps shall be perfectly opaque.

The LED board shall have uniform illumination with 4-8 W / sq. ft and with brightness more than ambient light. Suitable size end cap of 1.5 mm thick SS 304 should be provided.

2. Illumination:

Signage shall preferably be internally illuminated when provided in Station Building and Platform areas.

Signage shall be illuminated wherever required from back using Single/Multiple LED Modules each with IP 65 protection of white colour and rating of appropriate watts. Modules should be uniformly placed in a manner that at least one LED Module every 12 — 16 sq. inch of surface required illumination. Each signage should have an individual power supply adaptor for illumination of all LED installed in signage. The power supply adaptor should be placed inside signage and power supply adaptor should be connected using a plugin type connector connected to mains supply. LED to be used with five-year replacement warranty and specifications of LED module and Driver should be as per table below.

Parameter	Module
Operating Voltage	24V
Operating Temp	-25 to +70 Degree Celsius
BIS Certificate	IS 10322 (Part5/Sec7)-IEC 60598-2-20
LED Driver	
Power Factor	0.95
Input Voltage	180V - 270V

Parameter	Module
LED Module	
Module Wattage (W)	≥1 W
Colour Temp (K)	6500K
Chip	NICHIA/ CREE/ OSRAM/ SEOUL/ PHILIPS LUMILEDS/ LEDNIUM/ AVAGO/ SAMSUNG
Module Lumen/Watt	≥150 lm/W
IP Rating	IP66

Range	
THD	<5%
IP Rating	IP67
Line to Earth Surge Protection	6 KV
Line to Neutral Protection	4 KV
Efficiency	90%
BIS	IS15885
Expected Lifetime	50K Hrs
Protections	Yes

Beam Angle	≥160
CRI	>80
SDCM (colour consistency, binning)	=/< 3.0

3. Adhesives:

Two types of adhesives can be used to paste the base sheeting with top surface sheet. Pressure sensitive adhesive of the aggressive tack type requires no heat, solvent or other preparation for adhesion to a smooth clean surface. Tack free adhesive activated by heat requires heat for making a durable bond between materials. The heat is generally applied in a heat vacuum applicator. The adhesive thus formed shall have a durable bond to smooth, corrosion and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting from the sign base material in one piece by use of sharp instrument. The surface preparation and application process shall be in accordance with the manufacturer's specifications.

4. Fabrication:

The base material shall be first removed of any grease, oil, scale/dust or any other contaminants with the help of either acid or hot alkaline to obtain a smooth plain surface before the application of top surface sheet. If the base material surface is rough, approved surface primer shall be used. After cleaning, the materials shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of top surface material.

Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure sensitive adhesives shall be overlapped not less than 5 mm. Sheeting with heat activated adhesives may be splices with an overlap not less than 5 mm or butted with a gap not exceeding 0.75 mm. The material shall cover the sign surface evenly and shall be free from twists, cracks, and folds. Cut- outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

5. Text, Pictograms and Arrows:

The information on the sign boards shall either be screen printed or of cut outs. Screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. Cut-outs shall be of materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer.

6. Mounting – Mounting arrangement shall be hanging, wall / ceiling / pole / floor mounting, as per site requirement. Sign boards shall be with integrated mounting arrangement powder coated pipes to FOB/PF structure and supplied with PVC insulated & sheathed FRLS multi-stranded copper cable as per IS:694 with latest amendments and approved make of size not less than meter 1.5 sq.mm., approved make socket pin for connecting to power supply system. The sign board shall be fixed with suitable clamping arrangement

with galvanised nut, bolt, washers, chuck nut or welding etc. Clamps shall be painted with two coats of red oxide and enamel paint of approved colour.

The installation/erection of signages should be executed in accordance with industry best practices followed for achieving high standards of workmanship, thus ensuring safety and durability of the Works. The design of various components, assemblies and subassemblies should be done so that it facilitates easy field assembly and dismantling.

7. Fonts for Signages

- i) The English text for signage shall be Helvetica Bold font for all non-illuminated signs and illuminated signs.
- ii) A complementary font Utsaah Bold shall be used for all Hindi text. The same can be downloaded from official Lok Sabha Website.
- iii) For regional language, the fonts shall be suitably selected. Reference can be made from major Airport of the respective state or as used by State Government. SakalBharati (OTF) Font as available at tdil-dc.in may also be explored wherever required.
- iv) Font size must be suitably selected to achieve the required cap height depending upon the expected viewing distance of particular signage.
- v) Where bilingual signage is used, font size of both the languages shall be the same and as mentioned above. Where trilingual signage is to be used, regional language will be the main language and its font size will be as mentioned above and font size of other two languages shall be approximately 50% to 60% of the size of regional language.

8. Colour Scheme

Following colours shall be used on signages:

Types of Signage	Description of colour for background and signage matter
Identification & Directional related to train boarding (e.g., PF no., FOB no., entry etc.), buildings/ facilities integrated like BUS, Metro, High Speed with station and Utilities (e.g., Waiting room, VIP lounge, Clock Room, Parcel etc.)	Dark Blue Background with White Text/ Arrow/ Logo.
Way Out	Dark Blue Background with Yellow Text
Emergency Exit	Green Background with White Text/ Arrow/ Logo. The green safety colour should cover at least 50% of the surface of the sign
Caution/Warning/Prohibited Items	Yellow Background with Black Text
Safety/Security	Red Background with White Text along with Symbols.
Room name board related to passenger facility/ utility/ amenities and Railway Offices	Orange background with white text.

If a given Railway Station has segregated platforms catering to different train types like Local/ Mail Express or BG/MG etc. then different colour schemes can be used for wayfinding of different areas for ease of passengers. Floro-graphic signages can also be used to separate and distinguish different train types with Marking lamination (anti-skid lamination).

9. **Sizes of Boards -**

The size of board shall of different sizes, as per the site requirement based on the matter/ information to be displayed, decided after site survey & design.

(Please refer document for guidance of glow sign boards and signages)

Annex .	Schedule Description	Item	Unit	Details Technical Specifications
VIII	Supply, testing and commissioning of auto transfer switch (ATS) of 4 pole, 3 phase, 200A capacity, in MS enclosure.	fixing,	No.	<ol style="list-style-type: none"> 1. Supply, fixing, testing and commissioning of Automatic Transfer Switch (ATS) of 4 pole, 3 phase, 415V, in MS enclosure, conforming to IS/IEC/EN 60947-3, IS / IEC / EN 60947-6-1. 2. Capacity and quantity of ATS shall be as mentioned in the corresponding item of tender schedule. 3. The complete unit shall be mounted in a smart engineered MS enclosure providing a ready, convenient-to-use Automatic Source Transfer Solution. 4. The ATS shall automatically switch from 'main supply' to 'back-up supply' upon occurrence of pre-set conditions such as failure of supply, voltage level beyond set limits and so on. Inbuilt control switch for selecting auto/manual mode. 5. Enclosed ATS shall be completely pre-wired and pre-programmed solution with inbuilt micro-processor based controller, and with all accessories i.e. operating mechanism /operating handle, protection, etc., required for installation, testing and commissioning. It should have ample space for cable termination, no need of separate cable gland box. 6. Safety - Protections: UV/OV, Phase Sequence, Single Phasing, Frequency. Inbuilt Terminal Shrouds, Phase Barriers & Source Separators. 7. The contractor should carry out the work of providing ATS with necessary wiring in the existing power circuit as per instruction of Supervisor Incharge, cable for connection will be supplied by Railway. 8. The contractor shall provide cable glands, grommets etc. along with bimetallic /copper lugs properly crimped. 9. The door of the box shall have interlocking arrangement in the middle and 2 Nos. screwed knobs also on the bottom and top. 10. The box shall be provided with earth terminals on two sides and shall be connected to main earth using 8 SWG G.I. wire upto 3 mtr. A caution plate/sticker of 415V danger shall be provided on the front door. 11. The unit shall be fixed on the wall with proper fixing arrangement i.e. with M.S. brackets/Anchor fasteners of suitable sizes and Nos. 12. Catalog no. & specification details of each type / capacity of switch to be submitted by the firm.
IX	Supply, testing and commissioning of 125A, 4 pole electronic / microprocessor based MCCBs with	fixing,	No.	<ol style="list-style-type: none"> 1. The MCCBs switch shall be 4 pole, 415V AC, 50 Hz, of capacity 125A, confirming to IS/IEC 60947-2 & IEC 60947-2. 2. The capacity and quantity of MCCBs shall be as per requirement, mentioned in the corresponding item of the schedule. 3. The rated service breaking capacity should be equal to rated ultimate breaking capacities ($I_{cs}=I_{cu}=100\%$). 4. The MCCB shall be of 36KA braking capacity, with microprocessor-based

	inbuilt earth fault protection along-with earth leakage protection having shunt coil, earth leakage relay 30mA-30A, CBCT etc., with enclosure.		<p>having inbuilt adjustable protection against, overload, short circuit, instantaneous, earth fault protection.</p> <ol style="list-style-type: none"> Adjustable earth leakage relay ELR protection shall be provided with the MCCBs in the panels, wherever mentioned in the schedule. It shall be by means of providing external settable earth leakage protection, 240V AC Shunt coil, earth leakage relay 300mA-30A, CBCT (Core Balance Current Transformer) etc., with adjustable sensitivity. The system shall be designed so that the ELR can be seamlessly integrated and used in conjunction with the MCCBs. MCCB should be equipped with Quick make, Quick break & trip free mechanism. The MCCB should be of current limiting design. MCCBs shall be complete with operating mechanism, spreader terminals, Extended rotary handle with door defeat facility & padlocking facility, Trip, Auxiliary contact along with UV/shunt release, and other accessories of appropriate rating, as per site requirement, conform to IS: 13947 Part 2, IEC 60947-2, EN 60947. The successful tenderer should submit delivery challan / copy of original voucher of OEM / Authorized dealer to ascertain originality of items like MCCBs, shunt coil, CTBTs etc. Catalog no. & specification details of each type / capacity of MCCB also to be submitted by the firm. The switch shall be in sheet steel enclosure with cable end boxes on both incoming and outgoing sides, duly painted with enamel / Powder coated paint as final two coats in white or off-white in colour to M.S. enclosure. The enclosure shall be provided with earth terminal on side wall and shall be connected with the earthing. The unit shall be fixed by removing existing defective switch and reconnecting the incoming & outgoing cables/ wires. The unit shall be fixed on the wall with proper fixing arrangement i.e. with M.S. brackets/Anchor fasteners of suitable sizes and Nos. The connections of the cables shall be provided with cable glands & bi metallic type crimping sockets while connecting cable.
X	Supply of XLPE insulated & PVC sheathed, armoured, multi-stranded, 1.1 KV grade, copper / aluminium conductor cable.	Mtr.	<ol style="list-style-type: none"> Supply of LT cable 2/3/4-core, XLPE insulated, aluminium/copper conductor, armoured and suitable for over/ underground installation. Conductor material, size, and quantity of cables shall be as mentioned in the corresponding item of tender schedule. <ol style="list-style-type: none"> Alluminium Conductor: Type: A2XFY. The aluminium conductor shall be of H2/H4 grade as per IS 8130:2013, Class 2 (stranded shaped). Copper Conductor: Type: 2XFY. The copper conductor shall be of H2/H4 grade, high-conductivity annealed copper as per IS 8130:2013, Class 2 (stranded shaped). The LT cable shall be 1100V grade, XLPE insulated, FRLSH PVC sheathed with extruding process, armoured, multi-stranded, confirming to IS: 7098 Part I (amendment 1 or latest) with improved flame retardant features as per category C-2 of IS: 7098 Part I (amendment 1 or latest) and ISI marked. Cable shall be halogen-free, low smoke, low toxicity, flame retardant, fulfilling IEC 60332-1 requirements. Core Identification: Cores shall be colour coded as Red, Yellow, Blue,

			<p>and Black.</p> <ol style="list-style-type: none"> 6. High Voltage Test - The cable shall withstand an AC high voltage test of 3.0 kV for 5 minutes between conductor and armour without breakdown, as per IS 7098 (Part 1) and IS 10810 (Part 32/45). 7. Flammability Test - Period of burning after removal of the flame shall not exceed 60 seconds and the unaffected (uncharred) portion from the lower edge of the top clamp shall be at least 50 mm. 8. The outer sheath shall be clearly durable marked with "Manufacturer's name, size, type, voltage, IS:7098 (Part 1), year of manufacture, and running meter marking" as per IS norm. 9. The cables supplied by the contractor shall be manufactured by a BIS licensee holding a valid Certification Mark License (CM/L number) under the applicable IS standard. The ISI mark, along with the corresponding CM/L number, shall be clearly and legibly embossed on the outer sheath of the cable at regular intervals, in accordance with BIS guidelines. 10. Tests: The contractor shall submit original test report from Govt Lab/NABL approved lab as per relevant IS/IEC viz. IS:7098 Part-1, IS:10810, IEC 60332-1, IEC 60228 with latest amendments along with supply. 11. Make, Technical catalogues/ literature, test reports (as per relevant standards) from NABL accredited lab, Manufacturer shall be submitted with the supply. 12. Inspection – Inspection, if asked by Railway authority, shall be carried out with Railway Representative, at manufacturing premises as per IS : 10810, IS: 7098 Part I (amendment 1 or latest), IEC 60332-1, IEC 60228 for various tests like Routine tests, Acceptance tests etc as per requirement and specified in the relevant IS. 13. The successful tenderer should submit delivery challan / copy of original voucher of OEM / Authorized dealer. 14. The cable shall be supplied and transported to each of the locations by the contractor, where to be provided. 15. Cables with kinks, straightened kinks or any other apparent defects like defective armouring etc. shall not be supplied or laid.
XI	Supply, fixing, testing & commissioning of cable jointing kit for aluminium/ copper conductor XLPE insulated PVC sheathed, armoured cable	No.	<ol style="list-style-type: none"> 1. Scope covers supply of Epoxy / Polyurethane based 1.1 kV Heat shrinkable straight joint kits ISI mark (IS-13573:2011) and jointing of 1.1 kV, 4 core, aluminium/ copper Conductor, PVC/ XLPE insulated, armoured cables of different sizes as mentioned in tender schedule. 2. The cable termination kit shall be suitable for terminating the cable on indoor or outdoor installation as per requirement. 3. Size and quantity shall be as mentioned in the corresponding item of tender schedule. 4. Each kit should contain the Line connectors/ Ferrules/ Sockets etc. of proper sizes as applicable. All kits are to be supplied with full kit contents for making a complete joint. 5. The joint kit shall be complete with all accessories, jointing material, insulating stress control and sealing material, lugs, nuts, bolts etc. as well as an instruction booklet explaining the method of using the kit. 6. The accessories shall be supplied in kit form. Each component of the kit shall carry the manufacturer's mark of origin. 7. The insulating tubing over the connector should be Dual Wall design

			<p>sleeve with entrapped lubricant.</p> <ol style="list-style-type: none"> 8. The sleeve shall be tested for ANSI C1191.1.1986 or equivalent standard. Type Test Report for the same shall be submitted. 9. The installation of joint shall be done without use of special tools like crimping tool. 10. Conductor connection shall be achieved by use of connectors with pre-defined shear off bolt head design. The connector should be range taking which can be used for both copper & Aluminium cables. 11. Armour Connectivity shall be maintained by using Tinned copper braid. 12. Armour Wrap to be provided for mechanical protection of joint body. 13. The design of joint shall be such that on completion of joint the cable can be charged immediately. 14. As per the IS 13573 (Part-I&II):2011 all kits shall be marked and labeled suitably for identification. <ol style="list-style-type: none"> a) Manufacturer's name or logo and the name of components wherever feasible; b) Type of jointing materials, the application; c) Batch number(s), where relevant; d) Product reference; e) Defined storage conditions and expiry date, if any; f) If relevant, the manufacturing date; g) Health and safety marking and handling instructions, where relevant; and h) Reference to compliance with this standard. 15. The jointing kit offered, shall be fully type tested at NABL Lab as per IS:13573 Part-II and IEC60502 standards, test report shall be submitted. The certificate of shelf life shall be submitted, it should be more than 05 years from the date of delivery. 16. Critical components used in cable accessories shall be of tested and proven quality as per relevant product specification/ ESI specification. Cable joints and terminations should be with FRLS properties as per IEC 60754-1&2. 17. Impulse withstand on Low voltage kits for cable size less than 50sqmm – 8kv and for cable size more than 50sqmm - 20kV. 18. The Kits shall be suitable for storage without deteriorating at a temperature up to 50 degree Celsius under normal conditions of storage. The stores/materials found defective within the guarantee period, shall be replaced by the contractor free of cost within one month of receipt of intimation. 19. The cable jointing kits shall be suitably packed to avoid damage or disturbance during transit or handling. Each Cable jointing kits may be suitably packed in the first instance to prevent ingress of moisture and dust and then placed in a cushioned carton of a suitable material to prevent damage due to shocks during transit. 20. Concerned Engineer-In-Charge will inform the contractor regarding the details of location, size of cable, quantity etc. for providing cable joint. 21. The contractor should ensure that electric supply is made 'DEAD' before starting the work of cable jointing and should take every care to avoid accident. 22. The individual cores of the cables shall be properly identified to avoid cross connections of the core while connecting them to the corresponding phases. The contractor shall engage skilled cable jointer for making the end termination. 23. In case during the course of test any joint proves faulty the contractor has to re-do the work at his own cost. After completion of jointing
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			<p>work, cable has to be tested and if found faulty, re jointing has to be carried out at contractors risk and cost.</p> <p>24. The contractor should not leave the site/spot unless the work is satisfactory completed and line is charged/ power supply is restored.</p>
XII	Supply and fixing of flange type cable glands made out of brass castings, outdoor type suitable for armoured cables.	No.	<ol style="list-style-type: none"> 1. Supply and fixing of flange type cable glands made out of brass castings, outdoor type suitable for armoured cables, confirming to IS-12943. 2. Size and quantity of glands shall be as mentioned in the corresponding item of tender schedule. 3. The gland shall comprise of brass body (Flange Type oval shape) and plate clamped with galvanized mild steel studs and nuts for clamping the armour of the cables, with neoprene rubber seal or better synthetic material. Tapered cone and nut to be provided for termination of cable. The cone and body taper suitable for giving a firm grip to the armour of the cable. 4. Shrouds and earth tags shall also be supplied and fixed with all glands, and shall be connected with earthing. 5. Gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. 6. Gland shall be fixed by making suitable opening for cable entry with electric drill (Hole Saw cutter or Knockout Punch)/ fixed to the existing cables connected in LT panels / switchgears in enclosures/ LT panels, as per advice of the SSE. Cables shall be disconnected, and reconnected after fixing of the suitable size glands. 7. SSE will obtain permission for shut down to carry out the work, as per requirement. 8. Work shall be done with due care for safe and trouble free execution of the work. While executing the work, care should be taken that, cables, wires etc. should not get damaged. 9. All safety measures shall be taken by contractor's staff to prevent accident while executing the work.
XIII	Excavation of the cable trench in normal soil under rail/ road and refilling back the excavated earth, restoring /repairing of flooring after lying of cable.	Mtr.	<ol style="list-style-type: none"> 1. Approximate depth of excavation in normal soil for cable trench shall be 1000mm in normal soil (other than rock, including, but not restricted to soil, sand, gravel soft or disintegrated rock etc.). However, dimension may vary depending upon site conditions & as per Railway Engineer's instructions with due approval. 2. The trench and lying of cable shall confirm to IS: 1255. 3. The excavation should be done by suitable means-manual or mechanical. 4. Adequate precautions should be taken not to damage any existing cable(s), pipes or any other such installations in the route during excavation. Contractor shall be solely responsible for all the damages and losses. If any damage occurs in the nearby cable, it should be attended by the contractor by providing cable jointing kit of proper size. 5. While crossing rail, care should be taken that track alignment is not disturbed. 6. The bottom of the trench shall be level and free from stones, brick bats etc. 7. The trenches shall be then back-filled with excavated earth, free from stones or other sharp ended debris and shall be rammed and watered, if necessary. 8. After the subsidence has ceased, trenches cut through roadways or

			<p>other paved areas shall be restored /repaired and made original, and – re-paved to the satisfaction of the Engineer-in-Charge.</p> <p>All the surplus earth/rock/debris shall be removed and disposed off out of the Rly boundary, to dumping ground or the places as specified by the local govt. authority.</p>
XIV	Excavation of cable trench in hard soil under rail/ road/rocky soil / platforms (stone / RCC/ rock) and refilling back the excavated earth, recasting of flooring after lying of cable.	Mtr.	<ol style="list-style-type: none"> 1. Approximate depth of excavation in hard soil for cable trench shall be 1000mm in hard cement concrete flooring under rail/ road/rocky soil / platforms (stone / RCC/ rock). However dimension may vary depending upon site conditions & as per Railway Engineer's instructions with due approval. 2. The trench and lying of cable shall confirm to IS: 1255. 3. The excavation should be done by suitable means-manual or mechanical. 4. Adequate precautions should be taken not to damage any existing cable(s), pipes or any other such installations in the route during excavation. Contractor shall be solely responsible for all the damages and losses. If any damage occurs in the nearby cable, it should be attended by the contractor by providing cable jointing kit of proper size. 5. While crossing rail, care should be taken that track alignment is not disturbed. 6. The bottom of the trench shall be level and free from stones, brick bats etc. 7. The trenches shall be then back-filled with excavated earth, free from stones or other sharp ended debris and shall be rammed and watered, if necessary. 8. After the subsidence has ceased, trenches cut through roadways or other paved areas shall be restored /repaired and made original, and – re-paved to the satisfaction of the Engineer-in-Charge. <p>All the surplus earth/rock/debris shall be removed and disposed off out of the Rly boundary, to dumping ground or the places as specified by the local govt. authority.</p>
XV	Removing of existing old/ defective/ unused cables of different sizes.	Mtr.	<ol style="list-style-type: none"> 1. Scope covers cautiously dismantling / removing, without damage, of existing different types of electrical wires, armoured cables, aerial wires with supporting clamps etc., of various sizes / capacities and lengths, from platform sheds, other buildings etc., with own tools & tackles, ladders etc. 2. There are PVC insulated and armoured cables of various sizes upto 120 mm². These cables are to be removed carefully & safely. 3. The work is to be carried out under the Supervision and guidance of SSE/P, who will guide and identify the cables which are to be removed. 4. After ensuring that, there is no electric power supply connected to the identified cables, then only the work shall be started. 5. All safety measures shall be taken by contractor's staff to prevent accident while executing the work. 6. The cables, which are to be removed, are clamped/ saddled in different portions of platforms and adjacent areas, parapet, railway buildings etc. 7. While removing the cables, care should be taken that, other cables which are not to be removed but running together / in parallel with these cables, should not get damaged. 8. If cables are running in bunch, and clamps or saddles are opened in order to remove some of the cables in the bunch, then the remaining

			<p>cables shall be properly clamped.</p> <p>9. Removed cables should be transported & shifted to the stores in the nearby station area, with the own labours, vehicle etc. as per instructions of SSE, and handed over with proper record.</p>
XVI	Supply, fixing, testing & commissioning of colour coded 6 Nos x 25 sq.mm size hard drawn solid aluminium aerial wires with nominal PVC insulation of 1.2mm, including 8 SWG earthing wire, M.S. clamps / bracket with shackle insulators at end points for drawing the aerial cables & M.S clamps/brackets with bobbin insulators at middle points for supporting the aerial wires.	R. Mtr.	<ol style="list-style-type: none"> 1. The aerial cable shall be 25 sq.mm PVC insulated (heavy duty) with nominal insulation thickness 1.2mm hard drawn solid aluminum conductor. 2. The aerial cable shall not have any joint in the middle of the span and shall be in continuous length. 3. The cable shall be of 1100V grade confirming to IS 1554 (Part I) and of ISI marked. 4. G. I. Earthing wire of 8 SWG shall run along with the aerial cable. 5. The measurement of length of aerial cable shall be total length of single core 25 mm² aluminum cable divided by six. 6. End brackets shall be made out by M.S. angle 50 x 50 x 6mm and of adequate length to accommodate all aerial cables and G.I earthing wire. 7. The brackets shall be fixed on platform structure by M.S. clamps made out of 25mm x 6mm flat and nut bolts of 3/8" dia. 8. Shackle insulators of 50mm dia shall be used. 9. Supporting brackets for middle structure shall be made out of M.S. flat of 25mm x 6mm and M.S rod of 12mm dia. 10. Bobbin insulators of adequate size shall be provided with spacer between insulators. 11. All clamps and brackets shall be painted first with red oxide and final two coats of aluminum paint. 12. The wiring shall be carried out as per Indian Standard color code viz: Phase wire - Red (for single phase), Yellow & Blue, Neutral wire - Black and Earth wire - Green color only. 13. Colour code of aerial wires for various circuits like lights, fans etc. shall be as instructed by the Consignee.
XVII	Providing power supply connections to lights/ fans, with PVC insulated & sheathed, LSHF / ZHFR flexible multi strand copper cable of size 1.0 sq.mm. X 3 core, upto 3 meter length, in PVC conduit pipe.	No.	<ol style="list-style-type: none"> 1. The wiring along with earth wire shall be made with PVC insulated & sheathed, low smoke halogen free / zero halogen flame retardant wires, 1100 volt grade confirming to IS: 694 of 2010 or latest / IEC / NEC / NFPA Standards and ISI marked. 2. The firm shall submit relevant type test certificates from NABL approved lab to confirm LSHF / ZHFR wires. 3. Size of wire - 03 core x 1.0 sq.mm. Material - Multi strand copper conductor. 4. The wiring shall be confirming to the IS 732:1989 Code of practice for electrical wiring installations (third revision Reaffirm March 2010), with latest amendment. 5. The wiring shall be made with uPVC conduit pipes of minimum 20mm dia. plumber grade, complete with all accessories, PVC clamps etc. The size of the pipe shall be increased as the number of wires increased. 6. The pipe shall be rigid, heavy duty uPVC toughened molding composites TMC round pipe with properties of anti-corrosive, dust-proof, rust-proof, shock-proof, high-strength, weather proof, fire retardant, nonconductive, homogeneous, free from visible cracks, holes or foreign inclusions, maintenance free & durable.

			<ol style="list-style-type: none"> 7. Rigid PVC conduit pipes having marking 'heavy' / 'HMS' (heavy mechanical stresses) and 'ISI' shall be used. PVC conduit pipes shall be conforming to IS: 9537 (Part III) and all PVC accessories shall be conforming to IS: 3419. 8. All the dimensions and thickness of PVC conduit shall be conforming to relevant IS, with thickness of pipe at least 2 mm thick. 9. It shall be complete with wiring from aerial wires to light/ fan points upto 3 mtr length with joints bends as required to complete the wiring connection including all material required for fixing arrangement. The PVC conduit shall run aesthetically. 10. Connection shall be made to lights/ fans with proper workmanship. 11. Make of all above accessories shall be as per enclosed list of acceptable makes and as per sample approved.
XVIII	Supply and installation of GRP / FRP tray, RED in colour, made of glass fiber reinforced polyester moulding composite material SMC, including horizontal and vertical reducers, bends, tees, cross members etc. and other accessories, suitable to accommodate bus duct system and duly suspended from the ceiling with GI suspenders etc. as per requirement complete with all accessories. Size 200mm width x 75mm depth min. x 04mm thick min.	Mtr.	<ol style="list-style-type: none"> 1. Scope includes supply and fixing of GRP / FRP composite material made tray, RED in colour, of size 200mm width x 75mm depth min. x 04mm thick min, complete with all accessories, support arrangement, hardware, fittings etc. as per site requirement. 2. GRP / FRP material shall have minimum 60% glass content, with properties of anti-corrosive, dust-proof, rust-proof, shock-proof, high-strength, weather proof, fire retardant, non- conductive, non- magnetic & maintenance free. 3. The trays should be single section pultruded, (assembled trays will not be accepted). 4. Trays shall be complete with all fixing accessories, suitable to accommodate the bus duct system. Complete design, items, accessories etc shall be as per site conditions requirement, duly certified by the consignee. 5. Trays shall be channel /trough type perforated bottom and furnished as a system including all necessary fasteners, hold-down clips, support systems, covers, hinged horizontal and vertical splice plates, elbows, reducers, bends, tees, crosses etc and all necessary hardware etc. 6. Trays shall be erected in perfect level and plumb. 7. Trays shall not have sharp edges, burrs or projections injurious to the system. 8. Trays shall include fittings such as Inward / Outward Bends, Inward / Outward Risers, Tees, Reducers / Expanders, Crosses, Pultruded Coupler Plates with SS 304 or SS 316 Hardware, Horizontal & Vertical Moulded Hinges for flexible angle Bend, etc. for changes in direction and elevation. 9. Trays shall have support span of 1.5 Mtr to 2 Mtr, supported adequately at minimum 1mtr. distance from the building structure by means of painted / galvanized MS structural members secured to the structure by dash fasteners or by grouting. 10. The entire tray system shall be rigid. 11. Applicable Standards – <ol style="list-style-type: none"> a) NEMA FG1-1993 Standard for FRP/GRP Tray Loading Specifications. b) IS 6746:1994 Standard for Fire Retardant properties of FRP/GRP Trays. 12. Following Type Test Reports must be provided by the tenderer. <ol style="list-style-type: none"> a) U.V. Resistant - Type Test Report for weathering as per ASTM G154

			<p>for 1000 Hours (Equivalent to 10 Years of outdoor life) minimum with testing tensile strength test & flexural strength which shall not reduce by more than 5% after UV exposure.</p> <p>b) Fire Retardancy & Smoke Development Index - Type Tested as per ASTM E-84 meeting Flame Spread ≤ 25 & Smoke Spread Index ≤ 200.</p> <p>c) Dielectric Strength Shock Resistant - Dielectric strength Min. 6 kv/mm as per ASTM D149.</p> <p>d) Glow Wire Test - Must meet 960°C temperature as per IEC 60695-2-12-2000.</p> <p>e) Toxicity Index & Zero Halogen - As per NES 713 Toxicity Index < 1.0 & Halogen – NIL.</p> <p>f) Resistant to Heat & Fire - Meets IEC 695 Part 2 Sec 1-960°C</p> <p>13. All the reports for confirmation of materials, various parameters of specs and type tests must be from any Govt. Lab or International Lab or NABL Approved Lab.</p> <p>14. The successful tenderer should submit delivery challan / copy of original voucher of OEM / Authorized dealer to ascertain originality of the items.</p>
XIX	Supply, Fixing, testing and commissioning of bus duct trunking system of 40A (4+2) conductors, 3ph, 4 wire, IP55 with center/ end feed unit with MCB, straight lengths 3 mtrs with 3 outlets, ceiling bracket holder, suspension clamp, wall bracket, suspension hook, snap clamp etc. All suspension accessories shall be either galvanized or powder coated.	Mtr.	<p>Supply of all material, installation, testing and commissioning of bus duct trunking system of 40A (4+2) conductors, 3ph, 4 wire, IP55 with center/ end feed unit as per requirement with MCB, straight lengths 3 mtrs with 3 outlets, end covers, T joints, bends, couplings, required as per site conditions, ceiling bracket holder, suspension clamp, wall bracket, suspension hook, snap clamp etc. All suspension accessories shall be either galvanized or powder coated.</p> <p>1. General: The Electrical power shall be distributed by a “Bus bar Trunking system” and its accessories. All the components of the Bus bar Trunking fittings shall be IP 55, in any positions, in accordance with IEC 60529. After the dismantling of tap-off unit, the IP 55 shall be restored by installing the blanking plate initially factory fitted. All the components composing the Bus bar trunking system shall be Halogen free and Silicon free. 1 or 2 circuits, single phase or 3 phase each shall be available, allowing different specialized circuits.</p> <p>2. Standards: All the stages of design, manufacturing and tests of the bus bar trunking system including its accessories shall be in compliance with all the requirements of IEC/EN 60439 -2 standard, and related certificates, issued by third party such as CPRI shall be available.</p> <p>3. Design:</p> <p>3.1. Straight lengths The carrier rail, which shall also ensure the function of protective earth conductor (PE), shall be crimp closed, made sheet steel pre-lacquered with RAL 9003 – white / RAL 7032 - Gray painting. 0, 2, 3, 2+1 or 3+2 tap off outlets shall be available on bus bar trunking. Or tap off outlets shall be available on every 1000mm on one side. Due to its importance about rigidity, the distance between two fixing points shall be able to be up to 1.5 meters. The installation of the</p>

luminaries/ fans etc. shall be possible at any point on the line, including the jointing units. The bus bar trunking shall be of minimum 1 mtr. and maximum 3 mtrs length.

Electrical and mechanical jointings shall be carried out simultaneously. Proper tightening at the end of the assembly operation shall be ensured by a captive screw with a notched base.

The electrical jointing unit shall ensure automatic and simultaneous connection of all live conductors. The contacts shall be clamp and spring type and exert no forces on the plastic parts. Flexible lengths shall be available to change directions to avoid obstacles.

3.2. Conductors:

2 or 4 conductors per circuit shall be insulated and made of copper tin plated on the whole length, to ensure reliable and better contacts.

As an option, a factory fitted dedicated earth conductor isolated from earth shall be available on the main circuit.

The bus bar trunking system shall have the following characteristics,

Rated current at 40°C (Inc) for standard circuit operation: 40A

Number of live conductors : 2+4

Rated insulation voltage (Ui) : 690V

Rated operating voltage (Ue) : 230 to 500V

Impulse withstand voltage (Ump) : 2.5KV

Frequency : 50/60Hz.

3.3. Short Circuit capacity

Optimum installation performance shall be ensured by coordinating the protection circuit breakers and the bus bar trunking, with equipment from the same manufacturer. Selection guides defining the rating of the circuit breaker required to fully protect the bus bar trunking shall be available to simplify the design of the installation. Breaking capacity shall be minimum 3.3KA.

3.4. Plug in connectors:

The bus bar trunking system shall derive the Electrical power by means of a range of plug in connectors, compatible with all the ranges of bus bar trunkings, from 25A to 40A, of the same manufacturer.

Connection and disconnection of the plug in connectors shall be possible, even when they are energized and under live conditions.

No live part can be able to be accessed at any time, before, during and after plugging.

For a better safety, during the connection of the plug in connectors, the PE connection shall occur prior to the connection of the phases and the neutral.

Phase selection plug in connectors shall be available.

Among the range of plug in connectors, 16A units, ensuring both the supply and the control of the lighting, with following options, shall be available:

Control by single circuit switch

The quality of the live contacts between the bus bar trunking and the plug in connectors shall be ensured by means of a spring clamp system.

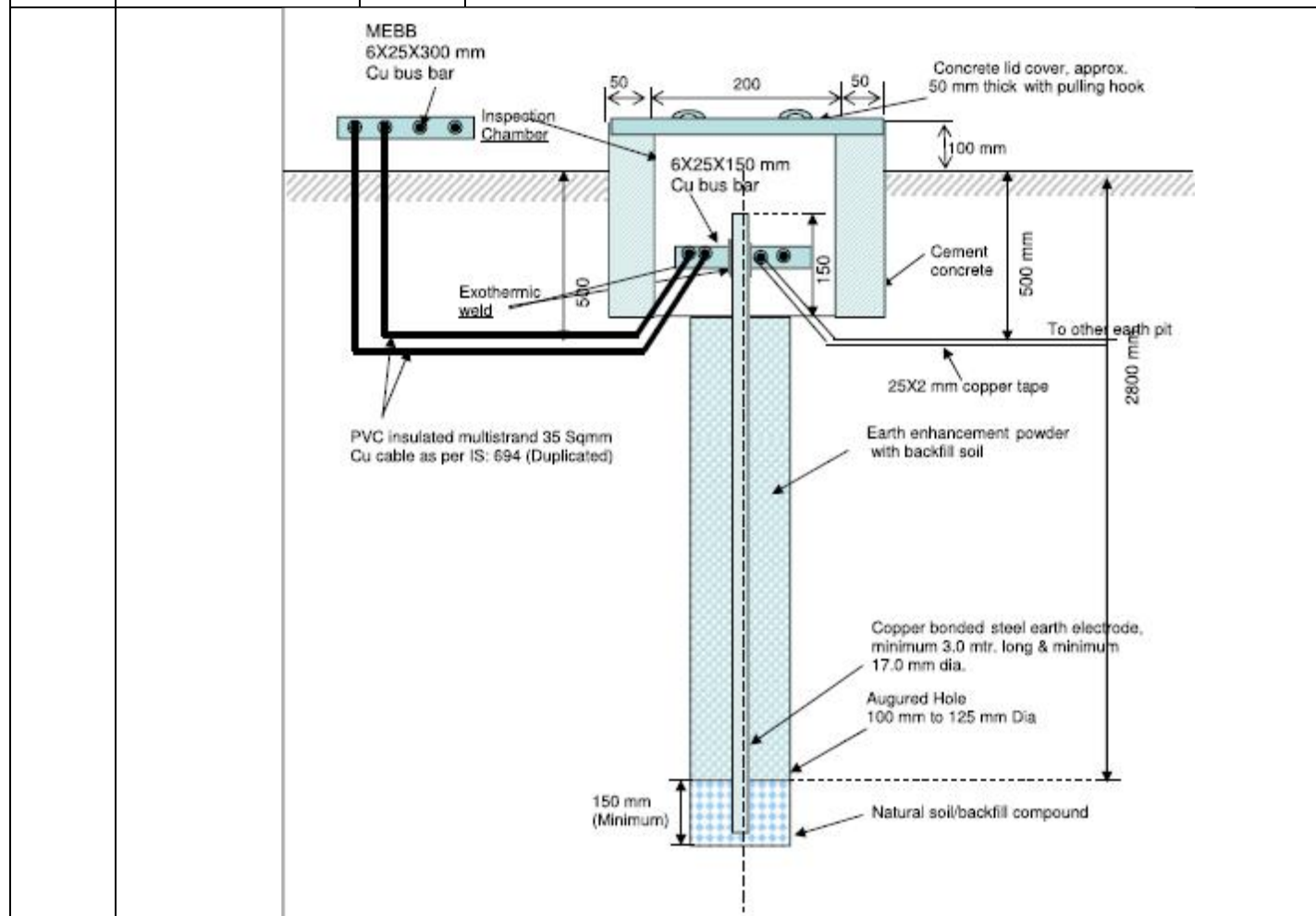
3.5. Fixing systems

Fixing systems for the mounting of both the trunking and the load equipment / fitting/ fans etc., with automatic locking around the

			trunking shall be available.
XX	Supply, fixing, testing and commissioning of plug in box/ tap off box of bus duct trunking system to light/ fan points with connecting wire of 3 core x 1.0 sq.mm. in PVC conduit to complete the wiring connection including all material required for fixing arrangement.	No.	<ol style="list-style-type: none"> 1. Supply of all material, installation, testing and commissioning of plug in box of bus duct trunking system. 10/16A universal tap off box/ plug in boxes of heavy duty PVC material with covers, 2 pole selection plugs suitable for 10A/16A glass fuse, connectors etc. 2. It shall be complete with wiring from plug in box to light/ fan points with upto 3 mtr length 2x 1.0 sq.mm. FRLS PVC insulated wire plus earth wire of 1.0 sq.mm. in surface PVC conduit with joints bends as required to complete the wiring connection including all material required for fixing arrangement. 3. The wiring shall be confirming to the IS 732:1989 Code of practice for electrical wiring installations (third revision Reaffirm March 2010), with latest amendment. 4. The PVC conduit/ flexible conduit shall run aesthetically. 5. Plug in box shall be of same make of OEM of the bus duct system.
XXI	Supply, fixing, testing and commissioning of flexible bend of 40A (4+2) conductors for bus duct trunking system, 3ph, 4 wire, IP55.	No.	<ol style="list-style-type: none"> 1. Supply of all material, installation, testing and commissioning of flexible bend of 40A (4+2) conductors for bus duct trunking system, 3ph, 4 wire, IP55. 2. Flexible bend conductor, of minimum 05 mtr length, shall be made of braided copper wire, and the connection section with excellent contacting property, 3. It shall be including all necessary components for connecting two ends of bus trunking. 4. Flexible bend shall be of same make of OEM of the bus duct system.
XXII	Supply, installation, testing & commissioning of Digital Astronomical daily time switch as per Legrand DX3/ AlphaRex3 or similar, with 25A 4NO contactor as per Legrand cat. No. 4125 51 or similar & 06 module cabinet IP65 as per Legrand cat. No. 6019 96 or similar, complete with internal wiring & connections, fixing arrangement.	No.	<ol style="list-style-type: none"> 1. Digital Astronomical Time Switch is to be provided for switching an electric circuit (lighting) ON or OFF at selected times during a pre-programmed time period. 2. One box of adequate size for each Time switch shall be supplied by the contractor. The box shall be as Legrand cat.no.601996 or equivalent Schnieder / Hensel make. 3. The box shall be made from impact resistant reinforced polystyrene, weather proof with IP65 protection. 4. The box shall be suitable for surface mounting with proper fixing arrangement. It shall be facilitated with the arrangement for incoming & outgoing circuits. 5. Each box shall be of adequate size with following arrangements. 6. Digital Astronomical Time Switch shall be one channel, Daily Cycle, 24Hr programme, Rated Voltage-230V, 50 Hz, as per as per Legrand DX3/AlphaRex3 or similar of HAGER/ L&T / Siemens/ GE/ Gelco make. 7. The 25A 4NO contactor shall be as per Legrand cat. No. 4125 51 or similar HAGER/ L&T / Siemens make. 8. The wires for interconnection shall be of PVC insulated unsheathed multi strand FRLS copper conductor single core, of size 4 sq.mm. , 1100 volt grade confirming to IS:694 of 2010 or latest / IEC / NEC / NFPA Standards and ISI marked.

XXIII	Supply of material & providing maintenance free earthing complete with copper earth busbar, GI main busbar & strips, and all other accessories, as per RDSO Spec No. RDSO/SPN/197/2008, Ver 1.0 or latest.	No.	<p>Maintenance free earthing complete with all accessories shall be as per RDSO Spec No. RDSO/SPN/197/2008, Ver 1.0 or latest.</p> <p>Maintenance free earthing shall consist of the following: -</p> <ol style="list-style-type: none"> 1. The earth electrode shall be UL listed and of minimum 17.0mm diameter and minimum 3.0mtrs. long. 2. The minimum copper bonding thickness shall be of 250 microns. 3. Marking: UL marking, Manufacturer's name or trade name, length, diameter, catalogue number must be punched on every earth electrode. 4. High tensile-low carbon steel rod having diameter not less than 17.0mm complying with requirements of Underwriters Laboratories (UL) 467-2007 or latest, Certificates from NABL approved labs shall be submitted with test results. 5. Earth electrode can be visually inspected, checked for dimensions and thickness of copper coating using micron gauge. The supplier shall arrange for such inspection at the time of supply, if so desired. 6. Copper earth busbar of size 150 mm x 25 mm x 6 mm shall be exothermically welded to rod with 2 on each side for connecting earthing conductor. 7. Earth Enhancement compound should have characteristics as mentioned in the RDSO specs., should have low resistivity preferably below 0.2 Ohm-meters. 8. Earth enhancement material (minimum approx. 30-35 kg) shall be filled into the augured/dug hole in slurry form and allowed to set. After the material gets set, the diameter of the composite structure (earth electrode + earth enhancement material) shall be of minimum 100mm dia covering entire length of the hole. 9. Marking: The Earth enhancement material shall be supplied in sealed, moisture proof bags. These bags shall be marked with Manufacturer's name or trade name, quantity etc. Certificates from NABL approved labs shall be submitted with test results. 10. Backfill material: Good quality soil or excavated soil free from sand, gravel and stones shall be used for backfilling. Material like sand, salt, coke breeze, cinders and ash shall not be used because of its acidic and corrosive nature. 11. Earth pit - A hole of 100mm to 125mm dia shall be augured /dug to a depth of about 2.8 meters. The earth electrode shall be placed into this hole. 12. Inspection chamber: A 300X300X300 mm (inside dimension) concrete box with smooth cement plaster finish shall be provided on the top of the pit. A concrete lid, painted black, approx. 50 mm. thick with pulling hooks, shall be provided to cover the earth pit. Care shall be taken regarding level of the floor surrounding the earth so that the connector is not too deep in the masonry or projecting out of it. On backside of the cover, date of the testing and average resistance value shall be written with yellow paint on black background. 13. Instead of copper busbar & strips/ copper cable mentioned in the drawing, a GI main busbar of min. size 300mm x 50mm x 6mm to be installed on nearby wall etc. It shall be connected to earthing with two GI strips of 50mm x 6mm size each, upto a distance of 10 mtrs from
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			<p>earth busbar.</p> <p>14. Earthing shall generally be carried out in accordance with the requirement of I.E. rules, 1956, as amended from time to time and shall confirm to IS: 3043 of 1987 with latest amendment.</p> <p>15. The earth value shall be measured & recorded at the site by painting on earth pit or nearest wall, along with date of testing. It shall be less than 1 ohm and neutral to earth voltage shall be less than 3 volts.</p> <p>16. The warranty of such system shall be 60 months from date of commissioning. During this period, any failure of earthing system due to improper materials & bad workmanship shall be attended free of cost by the supplier.</p> <p>17. General arrangement of the earth system shall be as per Drg. No. SDO / RDSO/ E&B/001.</p>
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XXIV	Supply and fixing of G.I. strip hot dip galvanized of size 25mm x 6mm for earthing.	Mtr.	<p>1. The GI flat strip shall be hot dip galvanized, 75 microns (minimum) & min. size 25mm x 6mm.</p> <p>2. It shall be provided from Earth electrode / main earthing terminal MET to the LT panel board / electrical equipments in proper manner, as per instructions of the Engineer In-charge.</p> <p>3. All work such as cutting, bending, supporting, soldering, coating, drilling brazing, clamping, bolting and connecting into structures, equipment frame, terminals, rails on other devices, shall be in the contractor's scope of work, and shall be done as per instructions of the Engineer In-charge.</p>
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			<ol style="list-style-type: none"> 4. The strip shall be properly fixed with suitable clamps and run along the wall / floor in such a manner that, it will not obstruct the movement. The extension of the flat shall be welded for earth continuity. 5. The material accessories and fitting such as bolts, washers, nuts, screws, cleats, clamps, anchors, fasteners etc. will be supplied by the contractor. 6. For installing earth strip on walls, special clamps shall be employed, which firmly accommodate the earth strips and are easily mounted. They can directly screwed to the wall. Fixing should be spaced not more than 1 m apart. 7. Earthing Strip which installed below ground should be covered with adequate insulating polyethylene sleeve to avoid corrosion. 8. Joints using GI conductors should be welded as far as possible. In case bolted joints cannot be avoided then there should be a minimum of 2 bolts of size 8X25MM. 9. Overlap for joining the strips should be minimum 50mm. All Earthing Strip to be joined together with two bolt arrangement & lap welding joints at all junctions. 10. Strip to strip and strip to equipment connections shall be made using GI bolts and nuts, flat washer and spring washer. For bolted joints, at least a bolt M10, hardened and tempered bolts with hexagonal head are to be used. 11. Wires shall be joined by means of lugs of appropriate size connected by bolts, nuts, check nuts and washers. If the connection is on a painted surface, the paint shall be thoroughly removed and the metal exposed for making effective electrical contact. Lugs and bolts shall be of brass for copper wires and for GI strips / wires. 12. Joints should be provided with coating alternative layers of red oxide and aluminium paint. Joints shall be kept separated from air by a thick coating of hot bitumen/ tar/ grease or similar non-hygroscopic materials. 13. All existing and new earth connections to the proposed GI strip shall be made by the contractor using GI bolts and nuts, flat washer and spring washer or lug sockets, as per site requirement, & instructions of the Engineer Incharge. 14. Metallic frames of all electrical equipment shall be earthed by two separate and distinct connection with earthing system. 15. On completion of the installation, continuity of all conductors and efficiently of all bonds and joints shall be tested.
XXV	Supply, laying, testing, fixing and commissioning of PVC insulated & PVC sheathed, multi-stranded, 1.1 KV grade, FRLS copper conductor cable single core in flexible / rigid PVC conduit, complete	Mtr.	<ol style="list-style-type: none"> 1. Supply, laying, fixing, testing and commissioning of LT copper conductor single core FRLS cable 1100V grade, PVC insulated & PVC sheathed, multi-stranded, confirming to 694 of 2010 or latest / IEC Standards and ISI marked. 2. Cable shall be low smoke, low toxicity, flame retardant, fulfilling IEC 60332-1 requirements. Type tests certificates from NABL approved labs, as per IS: 7098 Part I (amendment 1 or latest) for category C 2, as per relevant Para of IS: 10810 must be submitted with the supply. Conductor class shall confirm IEC 60228 class 5. 3. Make, Technical catalogues/ literature, type test reports (as per relevant standards) from CPRI/ ERDA/ NABL accredited lab,

	with clamping of the cables, and lugs at each connection. Size: 16 sq. mm. x single core.		<p>Manufacturer shall be submitted with the supply.</p> <ol style="list-style-type: none"> 4. The successful tenderer should submit delivery challan / copy of original voucher of OEM / Authorized dealer. 5. The cable shall be supplied and transported to each of the locations by the contractor, where to be provided. 6. Cables with kinks, straightened kinks or any other apparent defects etc. shall not be supplied or laid. 7. Lying of cable shall confirm to IS: 1255. 8. Cable shall not be bent sharp to a small radius, while handling or laying. 9. The cables shall be laid direct in ground, pipe, closed or open ducts, cables trays or along wall/RCC structure etc., under and across Railway track, with suitable size of flexible PVC conduit and fixing arrangement as per site condition. 10. Cable identification tags shall be provided throughout the length at every 10 meters. 11. Cable shall be terminated in the panel / switch by providing proper size of cable glands & to be connected with bi-metallic crimping sockets / lugs according to the size of cables to the switch. All crimping sockets shall be crimped properly with the help of Hydraulic crimping machine, so that the incidence of loose connection shall be avoided. 12. The cable with flexible / rigid PVC conduit shall be clamped on wall / structure of station building or any service building with M.S. clamps made out by M.S. flat of 25mm x 3mm size minimum, at every one meter distance. The clamp shall be suitably shaped as per the site requirement. The clamp shall be fabricated after the inspection at site by the contractor. 13. The clamp shall be fixed with suitable galvanized nut bolts/ fasteners with washers / standard quality counter sunk headed self-threading G.I. screw. The clamp shall be painted first with anti-corrosive red oxide and then two coats of aluminum paints.
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TERMS AND CONDITIONS:

- i) Successful contractor should have experience in carrying out such jobs.
- ii) The tenderer shall inspect the sites/ locations/stations under proposal and satisfy themselves before quoting. No request for modification or change of equipment will be entertained after issue of letter of acceptance.
- iii) The rates quoted by Contractor / Tenderer and accepted by Railway Administration shall be firm and hold good till the completion of the work and shall not subject to variation. No claims what so ever on this account shall be entertained at any stage. The prices shall be firm & net inclusive of all taxes, duties, freights & other incidental charges.
- iv) Contractor should ensure that the rates quoted by them should comply with the extant provision of Minimum wages act 1948.
- v) The contractor should submit his address and the telephone numbers of his Registered Office, Service Centre, where complaints shall be communicated.
- vi) The staff employed by the contractor for performing the duties or any other purpose related with the contractual activities shall be employees of the contractor only and they may in no way whatsoever claim to be employees of the Railways. If Railway is liable to pay claim to the labour on any ground, the contractor will indemnify the Railway Administration for the same. The contractor shall be fully responsible for conduct of the staff deputed by him.

- vii) The successful tenderer must appoint requisite trained staff. They should have proper knowledge of the work being done, as well as knowledge to keep the equipment properly intact and well adjusted. The equipment shall remain efficient, reliable and in safe operation running condition.
- viii) The contractors shall have all facilities, instruments / equipment, tools & plants, staff, technicians, Supervisors, Engineers etc. for the execution of the proposed work, so as to keep minimum down time of the equipment if any. All the materials required for execution of the work including supply of items like brush, broom, cotton duster etc. required for cleaning purpose should be arranged by the contractor.
- ix) The contractors shall issue identity cards at their own cost to the staff for their entry in Railway premises, IDs countersigned by Railway's authorized representative.
- x) Staff employed should be medically fit and should be in the position of taking instant decision to avoid any eventuality.
- xi) The contractor shall provide one mobile phone to their staff, registered on the name of company/ contractors' staff, on which the Railway's representative may contact at any time, phones shall be maintained in good working condition for smooth & easy communication. Phone Bills shall be paid by the contractor.
- xii) The transportation charges shall be borne by the contractor. The Contractor and his service personnel should make their own arrangement for travel on Indian Railway, Railway will not provide free any traveling facility for them.
- xiii) The contractor shall maintain the detailed information of assets handed over to him and same will be verified at the time of taking over from the In-charge.
- xiv) Any part of the unit is required to be shifted to service centre for repair purposes, the transportation charges shall be borne by the contractor.
- xv) The entire work and repairs, replacement of parts, maintenance should be carried out as per OEM's recommendations.
- xvi) All safety measures shall be taken by contractor's staff to prevent accident while executing the work. No compensation towards any accident will be paid by Railway.
- xvii) The Engineer / Staff nominated by the contractor for the work at any location shall observe all Safety and Security Rules prevailing at the place of work.
- xviii) Any damage to Railway equipment/structure/property, if takes place due to the negligence & carelessness of contractor's staff, will be contractors' responsibility and the cost of repair of installation/assets will be borne by the contractor.
- xix) If any accident takes place due to work done / working by contractor or his staff, the liability arising out of this will be of the contractor.
- xx) The contractor or his staff shall not remove any item / equipment or any part or component of it without prior approval / knowledge of the nominated Railway representative/ Railway Authority.
- xxi) **ERROR-OMISSION AND DISCREPANCIES:** The tenderers shall not take advantages of any error due to typing or otherwise. If there is any doubt, that shall be brought to the notice of the Sr. Divisional Electrical Engineer (Power), Western Railway, Divisional Railway Manager's office, Mumbai Central, without delay. In case of any contradiction, only the printed rules and books shall be followed and no claim for the misinterpretation shall be entertained.
- xxii) **Inspection of Material:** Any kind of testing required to confirm suitability of material either at manufacturer's premises or at Railway Stores, before material is accepted by consignee, shall be the responsibility of contractor. Inspection of the materials will be carried out, if mentioned specifically, at the Manufacturer's premises prior to dispatch in presence of Contractor's representative. All charges for inspection at manufacture premises shall be borne by the contractor. All the materials/equipment to be supplied shall conform to the relevant specification only.

- xxiii) Any Alteration/ addition take place while carrying out the work, it is within the power of Sr.DEE/P/MMCT.
- xxiv) Subletting of contract: The contractor shall not assign sublet the contract in the interest therein or the part thereof to any other party or partner(s) without the consent of the Railway.
- xxv) The successful tenderer shall carry out the work to the entire satisfaction of the Railway.
- xxvi) Railway reserves all rights to terminate the contract before/after the expiry of the contract period without assigning any reasons with a notice of 15 days. This will normally be as a result unsatisfactory performance of the contract.
- xxvii) Disputes, doubts etc: In case if any discrepancies, disputes, doubts arise during the tenure of this contract, such things shall be mutually discussed with Sr.DEE(P)MMCT & the decision conveyed by him shall be final binding with both the Railways and the Contractor.

NOTE:

1. **Electrical Contractor License:** The contractor himself or the Sub-Contractor appointed by him must have valid Electrical Contractor's License issued by any State Government in their own name or in the name of the firm, as per IE Rule 1956 clause No. 45 or as amended from time to time. A copy of the license shall be uploaded along with the tender offer failing which the offer shall be summarily rejected.

The license must be valid as on the date of opening of the tender. If the license has been expired as on the date of opening of tender, the license renewal documents must be uploaded along with the copy of the old license. The Contractor or the Sub-Contractor appointed by him shall possess valid License throughout the currency of the contract. The contractor shall ensure timely renewal of license.
2. The work shall be carried out successfully as per the Indian Electricity Rules & regulation, and code of practice amended upto date.
3. Railway will permit the contractor, his employees for execution of the proposed work. Consignee will supervise the work.
4. The successful tenderer should submit delivery challan and copy of original voucher of original manufacturers / authorized dealer / copy of original bill to ascertain the originality of the item.
5. Octroi Exemption Certificate will be issued by Railway if required.
6. Released material should be handed over to Railways, and disposed as instructed.
7. No responsibility will be taken by Railway for any delay/loss/non-receipt of tender documents.
8. The tenderer should submit their Bank details (duly certified by the Bank) copy of PAN card, Cancelled Cheque, GST Certificate for NEFT purpose duly attested.

EXPLANATORY NOTES:

Explanatory notes and general information for various items are given below:

- i) Items details in the Schedule of Quantity and Rates shall be read in conjunction with specifications of tender for respective items.
- ii) All items of provision mentioned in SOR covers Design, Manufacture, Supply of materials, Erection, Testing and Commissioning as required including small parts such as bolts, nuts, lock nuts, washers etc.
- iii) The tenderer shall quote the offer in percentage above/below the schedule for rates both in figures and words.
- iv) The quoted percentage will be applicable to each item and rate of tender schedule for deciding the amount to be paid to the Contractor.
- v) The prices shall be commercially firm and without any ambiguity.
- vi) The basic quantities and components of materials, required to make a unit of work for selected items, are indicated for guidance only. There may be minor variation to suit erection but adjustment in prices of schedule shall not be made on that account.
- vii) In estimating the prices for various items of work, provision for loss and wastage in transit and erection should be provided for over and above the basic quantities, components and materials required to make an unit of work.
- viii) Wherever a list of material is indicated for supply and erection, then it will mean major materials but other minor material required for completion of concerned SOR items, tenderer has to arrange the same within the rates applicable to that particular item.
- ix) Contractor should note that all specifications as per the latest amendments to RDSO/CORE/IS and other relevant standard specifications shall be applicable unless specified otherwise.
- x) The Contractor shall arrange all necessary tools, equipments, instruments, spares and other facilities for execution liason, checks and tests and commissioning as specified and decided by the engineer in-charge.
- xi) Testing and Commissioning: The successful tenderer shall demonstrate various efficiency and other related parameters as specified in the specification but not limited to, during testing and commissioning, as desired by the representative of the Electrical Engineer.
- xii) The information asked to be furnished shall be complete in all manner. If there is any entry like 'shall be furnished later' or blanks are left against any item, the tender is not likely to be considered.
- xiii) The contractor shall observe all colour code in wiring, viz. Red, Yellow, Blue for Phases, Black for Neutral and Green for Earthing.
- xiv) Any Alteration/ addition take place while carrying out the work, it is within the power of Sr.DEE (P) MMCT. Proposed locations / stations are tentative, which may vary at the time of execution of the work. Work site can be anywhere in suburban and non suburban section of the Mumbai Division.
- xv) Samples of all materials shall be got approved by the Sr Divisional Electrical Engineer (Power) Mumbai Central i.e. Sr.DEE (P) MMCT or his authorized representative. Also consignee will inspect these items after receipt of the material. Material shall be offered for inspection by Tenderer in a single lot for a particular item. As & when material is ready, same shall be communicated to the Consignee along with details of location / address. Technical needs /Specification /test reports etc shall be submitted to the Consignee before claiming of payment.
- xvi) The successful tenderer shall take electrical connection for site work (if needed), by submitting the charges as admissible.

SPECIAL CONDITIONS OF CONTRACT (SCC)

(Electrical Power Department)

1.0 General

- 1.1 The contract shall be governed by Indian Railway's Standard General Conditions of Contract (GCC) with latest amendment if any, and Special Condition of Contract (SCC) given below. The following special conditions shall supplement and be read in conjunction together with above General conditions of Contract (GCC)(with latest amendment if any), General/technical specifications, schedule of quantities, explanatory notes, drawings and any other document forming part of this tender.
- 1.2 Work under this contract shall be executed as given in this tender document and as required at site whether specifically shown or not. The Contractor shall carry out and complete the work under this contract in every respect in conformity with the contract documents, as per directions of and to the satisfaction of the Purchasers' Representative.

2.0 Interpretation

In all matters of clarifications, dispute of interpretation, the decision of the engineer in-charge of the work, shall be final and binding.

3.0 Scope of Work

- 3.1 The scope shall include as specified in the Schedule of Rates and Quantities, explanatory notes, technical specifications and other documents of the tender.

Scope of work under this contract shall include provisions as specified in schedule of work, specification as per in GCC, SCC and other documents comprising of tender document but not restricted to.

- 3.2 Tenderer shall go through the specifications, related standards, requirement schedule and other contract conditions and shall include all the provision whether specified clearly or not for successful testing and commissioning. All such provisions are deemed as included unless pointed out while quoting of the offer.
- 3.3 The contractor shall include the supply of entire materials in accordance with specification and the whole of the work necessary for the complete installation as set down in this specification and with the accompanying schedules and drawings. Materials and components not specifically stated in the specifications and/or bill of materials or noted on the drawings (or anywhere in the tender document) but which are necessary for satisfactory installation /commissioning and operation of the system shall be deemed to have been included in the scope of work.

4.0 Intent of Specifications

- 4.1 Technical specifications forming a part of this contract are intended to cover work referred herein enclosed. It is not the intent to specify completely herein all aspects of design, constructional features of equipment and details of the work to be carried out, but nevertheless the intent of the specification is to ensure that the equipment and work shall conform in all respects to the relevant Bureau of Indian Standard Specifications, Codes of Practice, Indian Electricity Act, Indian Electricity Rules and other Statutory Regulations as may be applicable and to high standards of engineering, design and workmanship. The equipment and work shall perform in continuous operation in a manner acceptable to the Purchaser's Representative who will interpret the meaning of the specifications and drawings and shall have the right to reject or accept any equipment or work, which in their assessment is not complete to meet the requirements of this specification and/or applicable Codes and Standards. Any item specially mentioned or not in the scope of work, but required to complete the work shall be deemed to be in the scope as per approved design, drawing & specification.
- 4.2 The work shall conform to all provisions of the relevant Government Legislation, Regulations and Bye- laws of the Central/Local Authorities and of any State Electricity Boards/Companies to whose system the

installation is Page 29 of 49 proposed to be connected. The Contractor shall arrange to give all necessary notices required under the said Acts, Regulations and/or Bye- laws.

- 4.3 The contractor shall examine the installations' specifications, drawings & schedule of quantities for feasibility & safety and may suggest or ask for change required if any to provide satisfactory & safe services of the equipment designated for the station but the decision of the engineer in-charge of the work shall be final and binding.

5.0 Specifications and Schedules

- 5.1 The Technical specifications and schedule of quantities & rates shall be considered as part of this contract and any work or materials shown in schedule and not called for in the specifications or vice versa, shall be executed as if specifically called for in both. The drawings if any are for the guidance of the contractor. Exact locations, distances and levels will be governed by the site conditions.
- 5.2 The quantities indicated in Schedule are approximate. The successful tenderer will place the order for materials only after carrying out survey jointly with railways as per site requirement.
- 5.3 Special conditions of contract (SCC) shall be read in conjunction with the general conditions of the contract, technical specifications, schedule of quantities, drawings and any other document forming part of this tender/contract. For any discrepancy between the general conditions and special conditions, provisions of special conditions shall prevail. For any discrepancy between technical specifications and schedule of quantities, the provisions of schedule of quantities shall prevail. The decision of the Engineer in-charge of the work shall be final and binding in the regard.
- 5.4 Wherever it is mentioned in the specifications that the Contractor shall perform certain work or provide certain facilities, it is understood that the Contractor shall do so at his own cost.

Contractor shall get the arranged material inspected/tested as required before use and shall not move/ dispose off the material so arranged without the written permission of authorized representative of Purchaser.

6.0 Site Working Conditions

- 6.1 Tenderers, if they so desire, can, before submitting the tender, inspect the site of the work after obtaining prior approval from Purchasers' Representative in order to familiarize themselves of the conditions of work prevailing at site as also quantum of statutory levies (taxes, duties etc.) applicable. No extra claim on account of lack of such knowledge shall be entertained after award of contract.

All equipments and works covered under this contract shall be capable of operating continuously at optimum efficiency and deliver rated output under extreme conditions prevailing at site throughout the year.

- 6.2 Contractor shall make all arrangements of power distribution and lighting etc at site as required for night working if any.

- 6.3 Work Under Power Block

Where the work is required to be carried out in Power Block, it shall be arranged & permit to work shall be issued by the Rly. to contractors' representative.

The contractor or his authorized supervisor/ representative shall, before commencement of work, arrange all man and material at site well in advance. Power block shall be arranged for works requiring power blocks according to traffic conditions, however purchaser shall take no responsibility for non-availability of power block or day/ night working and safety to be observed at site and contractor shall keep the purchaser indemnified/ insured against the same. The Contractor is required to flexibly plan activity and mobilize staff so as to complete the planned activity during available power/traffic block. It may be noted that contractor is liable for penalty on overshooting of such power/traffic block affecting train punctuality or any inconvenience

to Railways as deemed fit in the opinion of the engineer and may be recovered from dues payable to the contractor.

7.0 Materials and Equipment

- 7.1 Procurement of Material - All materials and equipment shall be new and of the approved make and design, and as per schedule of quantities and specifications of scope of work.
- 7.2 Approved Make - The Contractor shall arrange to provide all equipment/ accessories as required for the work as per the approved list of the makes as specified in the specifications, unless the change is approved by the Engineer, in case of non-availability or better substitute in writing. Where the list of approved is not available, the makes of items shall be approved by the engineer.
- 7.3 Mobilization of material & resources The contractor is required to mobilize all the material, resources and manpower as per the completion period and the agreed schedule with the engineer.
- 7.4 Account of released material: - All released materials/ unused materials should be handed over to the engineer's representative at the nominated depot/ place as directed by the engineer.

8.0 Co-ordination of work at site

The Contractor shall work in co-ordination and co- operation with other agencies at site and shall arrange to execute work as per site conditions. Any hold up shall be the responsibility of the Contractor and shall make him liable for damages as may be considered and levied by the Engineer.

9.0 Workmanship & Quality of work

- 9.1 The contractor is responsible for execution of contract as a whole in accordance with conditions of contract.
- 9.2 Good workmanship is an essential prerequisite to be complied for this work. Skilled workers under competent supervision shall carry out entire work in the most workmanlike manner by skilled workers under competent supervision.
- 9.3 In the event the Engineer or his representative finding the work being carried out in a defective or in an inefficient manner or at a slow rate, the decision of which shall be in the sole discretion of the Purchaser, he may give 7 days written notice, calling upon the Contractor to remove the defects. If the contractor fails to complete with such directions, the contract shall be terminated followed by 48 hours notice, a final termination notice will be issued and the security deposit will be forfeited in whole as liquidated damages.

10.0 Method of Measurement

- 10.1 The progressive work shall be certified progressively for supply installation, testing commissioning for each unit of work as specified in schedule of work to release payment as per payment conditions.
- 10.2 On completion and verification of each stage work as per agreed schedule of payment invoicing, the contractor shall offer for measurement with required details, internal check / quality assurance, abstract sheet and contractor shall produce claim for on account/running payment for verified quantities only.
- 10.3 All the payment claims submitted by the contractor shall be accompanied by the following documents:
 - i. Supplier's challan / manufacturer's challan for major items.
 - ii. Certificate of receipt of materials in good condition at Purchaser's depot/s duly accepted by the Purchaser's Engineer/representative.
 - iii. Test Reports
 - iv. Material Inspection Certificate granted by the Purchase
 - v. Indemnity Bond in the standard proforma

11.0 Completion of Work

11.1 The contractor shall complete the whole of the work in all respect on or before the date fixed in the contract or any authorized extension thereof. The Railway Administration is entitled to recover penalty as stipulated in the General Conditions of contract if the contractor is in default.

11.2 Final Acceptance On successful completion of the work and/or completion of guarantee period as the case may be, the Final acceptance certificate shall be issued. The final acceptance of the entire equipment installed on the group shall take effect from the date of expiry of the period of guarantee.

11.3 Refund of security deposit

11.3.1 Security deposit shall be returned to the contractor after successful completion of guarantee period as certified by the competent authority. The competent authority shall normally be the authority, who is competent to sign the contract. If the competent authority is of the rank lower than JA grade, then a JA grade officer (concerned with the work) should issue the certificate. Security Deposit shall be refunded to the Contractor on production and surrender of the related receipt granted by the Purchaser, and on production of the “No Claim Certificate” given by the Contractor duly counter – signed by the Purchaser’s Engineer.

11.3.2 The Security Deposit shall, however, be liable to be forfeited in case of any breach by the Contractor of any of the conditions of the contract or for non completion of the full contract without prejudice to other rights and remedies of the purchaser whether specifically provided for herein or other wise.

11.4 Settlement:

On final acceptance and successful completion of guarantee period as the case may be, the performance bank guarantee shall be released. The necessary recovery/penalties if any due from the contractor shall be adjusted from payment due or through encashment of Security deposit/Performance bank guarantee.

12.0 Supply of Materials, Tools, Plants and Equipments by the Purchaser.

The Purchaser shall supply no material, tools, plant and equipment. The Contractor has to arrange all tools, plant and equipment as well as materials required for the work.

13.0 Security of men, material & work

The contractor will be responsible for any damage/theft for part of the work completed till entire works be taken over by the Railway.

14.0 Drafting of vehicles

The vehicles and equipment of the contractor can be drafted by Railway administration in case of Accidents/Natural calamities involving human lives.

15.0 Indemnity

The contractor shall furnish the prescribed indemnity bond as per General Condition of Contract, for all Railway material issued to him for execution of work.

16.0 Guarantee/ Defect Liability: Refer Specification & scope of work.

17.0 Tools and Spare Parts

All tools, tackle and M&P required for erection and assembly of the equipments and installation covered by the contract shall be arranged by the contractor himself including consumable material required for successful commissioning.

18.0 Safety Measures

- 18.1 The contractor shall take all precautionary measures and conform to IE rules & regulations of “occupational safety and health hazards” and that of Railway’s safety in force for the time being in order to ensure the protection of his own and Railway personnel moving about or working on the Railway premises.
- 18.2 The Purchaser shall remain indemnified by the contractor in the event of any accident occurring in the normal course of work arising out of the failure of Contractor or his men to exercise reasonable precaution at all places of work whether or not, the purchaser decides to safety measures at any particular site of work.
- 18.3 The contractor shall remain fully responsible for ensuring safety and in case of any accident, shall bear cost of all damages to this equipment and men and also damages to Railway and its passengers. Engineer in- charge may impose any other condition necessary for a particular work on site.

19.0 COMPOSITE TENDER OF CIVIL AND ELECTRICAL WORKS

- 19.1 The contractor himself or the Sub-Contractor appointed by him, the detail of which should be furnished in the tender by the main tenderer, shall have valid Electrical Contractor License for carrying out electrical works. During course of execution, if Contractor proposes for change of Sub-Contractor, prior approval shall be taken from Electrical Department.
- 19.2 The execution of electrical work will be under the supervision of Electrical Department and the measurement for the same shall be made separately through their own measurement book.
- 19.3 The final payment will be released by the Engineering Department only after receiving NOC from the Electrical Department for satisfactory completion of electrical portion of work.

SAFETY INSTRUCTIONS:

- A. Following Instructions for the safety, but not limited to, shall be followed during execution of work:**
- 1) All contractual work should be carried out by trained workers in presence of competent supervision of the firm. Before leaving the site, supervisor must ensure that the work has been stopped and workers have cleared the workplace and left the site.
 - 2) Every contract worker / representative should be provided all required personal protective equipments by the firm and ensure its using during execution of the work by the firm representatives.
 - 3) Before execution of the work, considering all potential hazards associated in the work, contract workers / representatives should submit a written memo / intimation for getting permission from the concerned authorities.
 - 4) Ensure isolation of the site from all probable hindrances before starting the work.
 - 5) Standard electrically insulated tools should be used for such type of working and proper shutdown of electricity should be ensured by the firm representative before starting the work.
 - 6) “Permit to work” should be followed, whenever necessary.
 - 7) All applicable provision of the factories Act – 1948 and the factories rules – 1963 shall be followed, wherever required.
 - 8) All contract workers / representatives should be issued valid identity card by the authorized person of the firm and it should be available with the site supervisor / workers.

B. Following Procedure, but not limited to, shall be followed for safe working:

- 1) Proper power block to be obtained from Electrical Department, when digging work / Horizontal boring / Any other work have to be carried out.
- 2) Whenever track horizontal boring are required to carry out by electrical, signal and telecom and engg deptt., in view of safety, all these departments are required to carry out joint survey & drawing of same to be signed with these departments' branch officers.
- 3) Before undertaking work at any location, the main supply to the system to be disconnected by switching OFF the main switch / MCB etc. A person accompanying the working team shall be deputed to be available at the main panel / switch board besides putting up a "MAN AT WORK" board at the panel.
- 4) If fuses have been provided in main panel / switch board the these should be removed and kept in custody of working team of attending the failure and not to be kept in the vicinity of main panel / switch board.
- 5) All staff executing the work shall invariably use personal protective equipment like insulated shoes, hand gloves, insulated tools etc.
- 6) Before switching OFF the supply the technician executing the work shall check the healthy condition of his TEST LAMP and presence of supply.
- 7) If there is any other supply source in the vicinity such as inverter supply, DG set supply, solar supply etc. the action shall be taken to isolate the same.
- 8) Before starting the actual work, the technician will once again ensure with the TEST LAMP, that the power supply has actually been switched off besides taking verbal confirmation from the person deputed to switch OFF the supply.
- 9) Extra precautions to be taken while working on electrical equipments which are fitted at a considerable height from ground level like street lights, platform gantry lights, high bay fittings, high masts, overhead lines etc. In such case an extra person shall be deputed to ensure stability of the ladder etc.
- 10) Before starting work in overhead lines, the technician shall always ensure that the line is properly earthed and shall remove the same before restoration of supply.
- 11) The power supply shall be restored only upon the instructions of the person who has instructed to switch OFF the supply before starting the work and taking conformation that the work has been completed and now it is safe to switch ON the supply. In no case the supply should not be restored upon the instructions of a different person.
- 12) After completion of work the supply systems viz, Main supply switches, inverter supply, DG Set supply, Solar supply etc shall be switched on to their original position and "MAN AT WORK" board shall be removed.
- 13) The above instructions must be ensured by site supervisor or most senior technician available at the site.

THE LIST OF MAKES FOR ELECTRICAL ITEMS (Electrical Power):

Sr. No.	Item	Makes
01	Cables and Wires - LT PVC insulated, sheathed, unsheathed	CCI, Universal, KEI, Finolex, RPG cable (KEC), Polycab, R.R. Kabel, HPL, Havells, Standard, Yogicab, Kolors, BENLO, Bharatcab, Vinay, Greatwhite, Kenter, ALEMAC, PM CONA, GM, Goldmedal, VISHAL Cables, Anchor/Panasonic, Luker.
02	PVC casing capping, PVC switch board	Prestoplast, Precision, Modi, Volex, Win, Press Fit, Ashoka, Bhagyalaxmi Plastic BLP

03	Switches, Sockets, Modular boxes & wiring accessories, holders, ceiling rose etc. Regulators for fans	Havells, Legrand, Anchor/ Panasonic, Siemens, Standard, Cabtree, Precision, Elleys (HI-FI), GM, Goldmedal, IndoAsian, Lauritz Knudsen LK/L&T, Polycab, Honeywell, Kolors, Greatwhite, Vinay, ABB, ALEMAC, PM CONA, Wattera/Wattcab.
04	PVC Conduit and accessories	Prestoplast, Precision, Modi, Press Fit, Polycab, AKG, Asian, Anchor/ Panasonic, VIP, Astral, Modi, Supreme, Greatwhite, PM CONA, Bhagyalaxmi Plastic BLP.
05	LEDs used in luminaires	Nichia, Osram, Seoul, Philips Lumileds, Cree, Samsung
06	Ceiling Fans	Havells, Bajaj, Orient, Usha, Crompton Greaves, Khaitan, Anchor/Panasonic, Atomberg, Superfan, Greatwhite, Goldmedal, Luker..
07	Exhaust fans / Wall bracket fans / Pedestal fans / Air circulators	Havells, Bajaj, Orient, Usha, Crompton Greaves, Khaitan, Anchor/Panasonic, Atomberg, Greatwhite, Goldmedal, Almonard, Standard, Luker.
08	HVLS fans	Austar, EcoAir, Epoch.
09	Geysers / water heaters	Recold, Venus, Usha, Lexus, Spherehot, Bajaj, Almonard, Standard, Havells, Crompton Greaves, Jaquar, Goldmedal.
10	MCBs, RCCB, RCBO & MCB DBs, Ray roll plug socket	Havells, Lauritz Knudsen LK/L&T, Indoasian, Legrand, GE, Siemens, ABB, hager, Schneider, Standard, C&S Greatwhite, ALEMAC, PM CONA, Press Fit, GM, Goldmedal, Anchor/ Panasonic, Wattera/Wattcab.
11	Polycarbonate enclosures IP65/66	Hensel, Cape Electric, Legrand, GE, Siemens, ABB, hager, Schneider, Havells, Greatwhite.
12	Armoured Cables LT / HT XLPE insulated	CCI-Cable Corporation of India, Universal Cable Co., NICCO, Gloster, KEI, Finolex cables, RPG Cable (KEC), Polycab, R.R. Kabel, Sterlite power, Torrent, Yogicab, Havells, Kenter, VISHAL Cables.
13	Cable Lugs, crimping sockets, ferules & accessories	Kamlesh Ind., KSE Electrical, Raychem, Dowells, Jainsons, Ascon (Heavy gauge), Comet, Hex.
14	Brass Gland End Termination	Raychem, 3M, Denson, M-seal, Mahindra & Mahindra, CCI, Dowells, Comet, Hex, NMI, Jainsons, Peeco
15	Cable joint & Termination kit	M-Seal, Raychem, Dowells, Kaycee, Jainson, Cabseal, Mozfit, 3M, Denson, Comet, Hex, Mahindra & Mahindra, CCI, RPG.
16	GRP / FRP Cable Junction boxes / looping boxes / Cable trays	Sintex, Bravo, Hensel, Cape Electric, Jindal Power Corporation, ERCON, Bajaj Electricals, Satyam Composites or similar.
17	GI Cable Tray & Cable ladder, Overhead & Floor Raceways	Stelco, Steelways, Slotco, Pilco, Patny, Indo Asian, Profab, Emco, Rattan, Supreme, Bravo Cable Trays, KR Power Supply, Copper Line, S.V.M (BJ), Legrand, MEM, OBO, Bhagyalaxmi Plastic BLP or similar.
18	SFU / ACB / MCCB (above 125Amp capacity)	Lauritz Knudsen LK, Legrand, GE, Siemens, ABB, hager, Schneider.
19	SFU / ACB / MCCB (upto 125Amp capacity)	Lauritz Knudsen LK, Legrand, GE, Siemens, ABB, hager, Schneider, Indoasian, Havells.
20	Change Over Switches - Automatic / Manual / ATS	Lauritz Knudsen LK, Indoasian, Legrand, GE, Siemens, ABB, hager, Schneider, Standard, Socomec, Cummins, Elmeasure.
21	Panel Manufacturer	Manufacturer having own CNC fabrication facility with Polyurethane Gasketing machine and pre-treatment plant, with CPRI approval.
22	Electronic Energy Meter	Lauritz Knudsen LK, Siemens, ABB, Legrand, Schneider, Selec, Elmeasure, Secure Enersol, Panasonic, Rishabh, Trinity.

23	Ammeters, Voltmeters, C.Ts and PTs	AE, IMP, MECO, HPL, Enercon , Kappa, Matrix, Secure, Schneider, Selec, Elmeasure, Crompton Greaves, JSL, C&S, Rico, Legrand, Panasonic / Anchor, Lauritz Knudsen LK/L&T, Siemens, Gilbert & Maxwell, Precise, Rishabh, Trinity.
24	Pumpsets	Kirloskar, Crompton Greaves, LUBI, KSB pumps, Grundfos, CRI, Mather & Platt, Texmo. Make of motor for pump shall be acceptable as per OEM of the pump.
25	Motor Starters	Lauritz Knudsen LK, Indoasian, Legrand, GE, Siemens, ABB, hager, Schneider, Crompton Greaves, Kirloskar.
26	Single Phase Preventers / Relays / Controller Units	Lauritz Knudsen LK, Legrand, GE, Siemens, ABB, hager, Schneider, Crompton Greaves, Kirloskar, Indoasian, Hitech Controls, Proton Power Controls, GIC, GELCO, Selec, Epcos, Havells, Khyatee, AREVA, MEI, Jyoti, Bienco Lawrie, Voltas, BHEL.
27	Contactors	Lauritz Knudsen LK, Legrand, GE, Siemens, ABB, hager, Schneider, Crompton Greaves.
28	PVC Pipe / Column Pipe	Finolex, Supreme, Astral, Ashirwad, Prince, Sudarshan, Precision or Modi, Falcon, Kisan, Dutron
29	GI / MS pipes	Tata, Zenith, Jindal, SAIL, Prakash, Asian.
30	Valves Butterfly, Sluice & Non-Return Valves	C&R, Audco, Castel, Leader, Honeywell, Kirloskar, Zoloto, Crescent, Fouress, DRP
31	Vacuum Circuit Breaker VCB / SF6	Lauritz Knudsen LK, Siemens, GE, ABB, Schneider, BHEL, Crompton Greaves, Areva, Megawin, Symatic make or RDSO/CORE approved make.
32	APFC (Automatic Power Factor Correction Panel), Power Capacitors	Lauritz Knudsen LK, Legrand, GE, Siemens, ABB, hager, Schneider, BHEL, Hind Rectifiers, Epcos, Shreem, Unistar, Neptune, W S Insulators, Asian Power.
33	Out door type heat shrinkable cable termination kit for 11/33KV cable	CCT, RECHEM, SAFE, COMPAQ or similar approved by Rly/MSEDCL
34	HT/LT cable joints (Straight through/outdoor/ indoor)	3M, Denson, G Seal, RAYCHEM, REPL India
35	Transformers	ABB, Siemens, BHEL, GEC, EMCO, Bharat Bijlee, Voltamp, Kirloskar, Tesla, Areva, Alstom, Crompton Greaves, High Volt, Voltas, NGEF, Deltron Electricals, Western Electricals, Megawin, Rishabh, RDSO / CORE approved make.
36	DG Set	Koel Green, Kirloskar, Cummins, Tata, Ashok Layland, Escorts, Caterpillar, Stamford, Leroy Somer, Mecc Alte, Sterling & Wilson, Caterpillar, Greaves, Mahindra, Sudhir, Jackson, Powerica.
37	UPS, Static switches	Numeric Power Systems Ltd, APC (Pillar), Emerson (Siemens), Luminous Power Technologies Pvt Ltd, Luminous, Protek-G, SUN, Power One Micro System, Delta, Techser, Socomec
38	Battery	Amara Raja, Exide, CSB, Panasonic, Hitachi, HBL, Amaron, Luminous, Furukawa, Shinkobe, Okaya, Eastman.
39	Battery charger	Caldyne, Chhabi Electricals, Statcon, Max Power, HBL, Nife, AE, Amar Raja, RDSO/RCF/ICF/CORE approved make.
40	SMPS	MEAN WELL, Corsair, Gigabyte, Cooler Master, Zebrionics, Intex or similar.
41	Surge Suppressor /protector, Spike guard	Havells, Lauritz Knudsen LK, Indoasian, Legrand, GE, Siemens, ABB, hager, Schneider, Standard, C&S, Anchor/ Panasonic.
42	Time Switches,	Lauritz Knudsen LK, Legrand, GE, Siemens, ABB, hager,

	Timers Astronomical & Solid state	Schneider, Crompton Greaves, Kirloskar, Indoasian, Hitech Controls, Proton Power Controls, GIC, GELCO, Selec, Havells, Khyatee, Protek-G, SUN, Emersion.
43	Electric insect killer / Fly Catcher Fitting	Fly, Kill lite, PCI, Wantrn, Wellberg or equivalent.
44	MS Conduit (ISI embossed black enameled/ galvanized)	BEC, AKG, NIC, Steel craft, M-Key, SK (E.R.W) or equivalent
45	Coupling socket for Coaching	S. International, MaaLaxmi Industry, RDSO/RCF/ICF/CORE approved make.
46	High Mast	Bajaj, Philips, Crompton, Valmont, Transrail, Wipro, Utkarsh, Vipin S.T.poles
47	G.I. Poles / Swaged poles	Bajaj, Crompton, Valmont, Transrail, Wipro, Utkarsh, Jindal Power Corporation, Skipper Ltd., Nezone, Beacon Power & Transmission, Shuvam Pole, Electro Poles Products, Atlas Project., Indian Electro Steel, Vipin S.T.poles
48	Street light pole made of composite GRP/ FRP material	Jindal Power Corporation, ERCON, Bajaj Electricals, Satyam Composites, Sumip Composites, EPP, TATA Steel or similar.
49	SS Wire Rope	Bharat Wire Rope, Usha Martin.
50	GOD, DO Fuse	Kiran, Pactil, Atlas, Damsa, RDSO / CORE approved make.
51	Lightning Arrestor	ABB, Elpro, CamaxIndia, Atlas, Alltec, JMV
52	Bust Duct / Rising Mains	Schneider, Universal, Lecto Egypt, GE, Legrand, Siemens, Lauritz Knudsen LK/L&T, C & S, ALFADUCT, Tricolite, Zeta, EAE-IIGM.
53	Flex, Venyl for Glow sign boards	LG, 3m, Penaflex, Metamark, Avery
54	Paint	Asian, Nerrolac, Dulux, Shalimar, Berger.

Air conditioning items:

55	AC units: Window / Split AC/AC Plant	Voltas, LG, Fedders Lloyd, Hitachi, Samsung, Panasonic, Daikin, O' general, Mitshubishi, Godrej, Carrier, Toshiba.
56	Water Coolers	Usha, Sidwal, Shriram, Voltas
57	VRF/VRV Units	Voltas, Hitachi, Daikin, O' general, Mitshubishi, Carrier, Toshiba, Samsung
58	Precision AC	Vertiv, Emmerson, Stulz, Uniflair, Climaveneta
59	Copper Pipe	Hindustan, Merchant, Indigo, Nippon, Supreme, Mandev, Rajco, Nissan, Nippon, Totaline, Maxflow
60	G I Sheets/ M S Structure/ beam /gurdar / channel	Jindal, SAIL, Essar, Tata, Zenith, Surya, NECO, IPR
61	Duct Insulation / Insulation acoustic / Sleeve Insulation	Armaflex, K-flex, Armacell, TwigaInsul, Birsal, Supreme, A Flex
62	Acoustic Enclosure	Jakson, Sudhir, Super Nova, Reliable, Equivalent
63	Chiller line Insulating	Thermoshell, Beardsell Ltd., Armaflex, Superlone, Century, ECOFLACK
64	Air diffuser / Grill / Fire Damper / Volume Control Damper	Cosmos, Dynacraft, Carryaire, Ravistar, Air Flow, Dynamic, Air Master, Asawa or equivalent.
65	Ventilation Fans	Caryaire, Systemair, Kruger, Nicotra, Flakt, Marathon
66	Air Compressor	Emersion, Copeland, Dunfoss, Kirloskar, Daikin, Atlas Copco, SumiMotherson, Hitachi
67	Vacuum Pump	Emersion, Copeland, Dunfoss, Kirloskar, Daikin, Atlas Copco, SumiMotherson, Hitachi
68	Condenser	Voltas, Hitachi, Daikin, O' general, Mitshubishi, Carrier,

		Toshiba
69	Motors	Crompton Greaves, BBL, ABB, Siemens, Kirloskar, Marathon, Rotomotive
70	AHU	Neutech, Zeco, Ethos, Caryaire, Citizen, Systemair, VTS
71	Fan of AHU	Comefri, Kruger, Nikotra, Punker
72	VFD	ABB, Siemens, Danfoss, Lauritz Knudsen LK/L&T, LS, SCHNEIDER
73	Heaters with factory-supplied Housing & Control Panel	Khokhar, Escorts, Daspas, Sushma
74	Controllers, Controls & Sensors	Johnson, Sauter, Staefa, Siemens, Honeywell, Schneider, ABB
75	HP/ LP Switch	DANFOSS, RANCO, INDFOSS
76	Pressure Gauges	Manometer, H Guru, GIC, AN Instrument
77	Pressure Switch	Indfoss, Switcher, VexmaTrafag
78	Cooling Tower	Paharpur, National, Perfect, Omkar, Choksi Group

Note –

- i) The equipment and materials to be supplied by the Contractor, from approved sources against various items, should conform to latest RDSO /CORE/ I.S. specification.
- ii) Only ISI items would be accepted and if ISI mark is not available then exception would be given by Sr. DEE/P/MMCT.
- iii) The above makes are acceptable subject to fulfilment of technical specification requirement.
