

NORTH WESTERN RAILWAY**SCHEDULE OF RATE / QTY****FORM'H'****E-TENDER NO. 04-EL-BKN-E-Tender-26-27**

Name of work:- Electrical work in c/w augmentation of PF shelter at 13 Nos. NSG-5 stations (Keshrisinghpur, Lunkaransar, Mahajan, Napasar, Nohar, Rajaldesar, Raman, Sadulsahar, Sangaria, Satnali, Sri Dungargarh, Sri Karanpur, Tehsil Bhadra) of Bikaner Division (Total 64 Bays at 22 PFs).

Schedule-A

SN	Description of work	Unit	Qty	Unit Rate	Amount
1	Supply / preparing of drawing in Auto CAD (Original + 2 copies) Jet Mat paper of 85/90 GSM showing over all electrical installation of Railway station / Service building etc. as per requirement.	Nos.	15	3765.00	56475.00
2	Supply of material and wiring of LP/TP/FP/Ex.Fan point with 1.5sqmm PVC single core multi-stranded copper wire insulated concealed in stone/brick masonry wall in 19/20 mm PVC conduit with 1.5sqmm PVC wire insulated copper for earth wire 1-way/2-way switch 5/6A as required and good quality ceiling rose including connection. This item includes modular switch, ceiling rose PVC conduit and required chase as per site.	Nos.	90	407.00	36630.00
3	Supply and fixing 5/6A plug, modular 3/5-pin 230V including modular switch and with modular board and connection as per spec.	Nos.	80	264.00	21120.00
4	Supply and fixing 15/16A plug, modular 5/6-pin 230V including modular switch and with modular board and connection as per spec.	Nos.	25	297.00	7425.00
5	Supply and fixing 2 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS / PVC as per site requirement and specification.	Nos.	45	124.00	5580.00
6	Supply and fixing 4 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS / PVC as per site requirement and specification.	Nos.	35	184.00	6440.00
7	Supply and fixing 6 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS / PVC as per site requirement and specification.	Nos.	30	229.00	6870.00
8	Supply and fixing 8 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS / PVC as per site requirement and specification.	Nos.	25	305.00	7625.00
9	Supply and fixing 12 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS / PVC as per site requirement and specification.	Nos.	20	338.00	6760.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
10	Wiring of sub-main with 2x2.5 sqmm PVC insulated, single core,multi-stranded copper wire in PVC conduit concealed and 2.5sqmm PVC insulated, single core, multi-stranded copper wire for earth wire as per spec. This item includes PVC conduit (25 mm) and chase as per requirement.	Mtrs.	1800	74.00	133200.00
11	Wiring of sub-main with 2x4 sqmm PVC insulated, single core,multi-stranded copper wire in PVC conduit concealed and 4.0 sqmm PVC insulated, single core, multi-stranded copper wire for earth wire as per spec. This item includes PVC conduit (25 mm) and chase as per requirement.	Mtrs.	800	127.00	101600.00
12	Wiring of sub-main with 2x6 sqmm PVC insulated, single core,multi-stranded copper wire in PVC conduit concealed and 6.0 sqmm PVC insulated, single core, multi-stranded copper wire for earth wire as per spec. This item includes PVC conduit (25 mm) and chase as per requirement.	Mtrs.	200	138.00	27600.00
13	Supply, laying, connection and commissioning of sub-main 2x10 Sqmm with PVC insulated single core copper conductor cable and same size PVC insulated copper conductor for earthing wire in ISI marked PVC conduit in recessed / on surface as per site requirement. This item includes PVC conduit (25 mm) and chase as per requirement.	Mtrs.	300	275.00	82500.00
14	Supply & wiring of light / fan point in covered shed with 1.5sq.mm multistrand copper, PVC insulated, single core wire in PVC 19/20 mm ISI PVC conduit pipe mounted on structure / shed with ceiling rose 5 Amp. mounted on wooden block / PVC junction box as per site requirement.	Nos.	2600	187.00	486200.00
15	Supplying and drawing 4.0 sq. mm PVC insulated multistrand copper conductor cable as submain and 1.5 sq. mm PVC insulated multistrand earth copper cable voltage grade 1.1 kV as earthing wire conforming to IS: 694-1990 in existing conduit/casing capping. Wire should be of reputed make and as per tech. spec.	Mtrs.	13000	42.00	546000.00
16	Fixing & commissioning of ceiling fan with nut bolt ensuring all safety aspects. Contractor is responsible for falling of fan within a period of 12 month.	Nos.	260	25.00	6500.00
17	Supply of 2 x 18W LED fitting, suitable for outdoor installations, integrated driver, complete with required necessary fixing accessories as per spec & site requirement. Minimum 5 years warranty.	Nos.	1000	1568.00	1568000.00
18	Erection, testing and commissioning of 2 x 18W LED fitting complete with connection and necessary fixing arrangements as per site requirement.	Nos.	1000	174.00	174000.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
19	Supply & fixing of battery-enabled emergency LED tube light fitting, 18-20 W, batten type, 4-feet long, complete with in-built Li-ion battery, providing minimum 04 hours backup at full load, including all accessories as per requirement. Reputed Make like Orient, Crompton, Phillips, Surya, Havells, Jaguar, Halonix, Bajaj, Wipro and Eveready with warranty of minimum 02 years.	Nos.	300	850.00	255000.00
20	Fabrication, supply, fixing, testing and commissioning of OFF delay timer panel comprising of analogue multifunction timer with OFF delay/Signal OFF delay function with timing range adjustable upto 30 minutes minimum for OFF delay (L&T GIC model no. Micon 175 – 1CMDT0 or similar of reputed make), 3 Pole power contactor AC3-40A / AC1-55A, 240 VAC coil, 2 nos. LED based illuminated flush type push switch with 2 NC/NO contact for ON/OFF, SP MCB 6A, 10 kA 'C' series for control wiring, four terminal connecting strip 63 A min. for incoming and outgoing and other accessories including power (min. 10 sqmm copper wire) and control(min. 1.0 sqmm copper wire) wiring. Panel should have good finishing in all respect to the satisfaction of Railway authority. Panel should be as per tech spec. and its sample should be got approved by competent authority prior to supply and commissioning.	Nos.	13	5060.00	65780.00
21	Supply of Phenolic top mobile charging wooden board size 6"x15" fitted with 4 nos. switch & 4 nos. socket of 6 Amps with internal wiring of 1.5 sq. mm multistrand copper wire with base plate of both side particle board for mobile with hanging clip as per requirement.	Nos.	100	398.00	39800.00
22	SETC of wall mounting mobile charging unit consisting of 6 Way Modular box with 10 A SP Mini MCB with i) 2.1 A USB Charging point - 4 Nos ii) 2.1 A (TYPE-C) Charging point - 1 No., Rack Type Charging Station suitable for charging multiple no. of devices simultaneously (Min 5 Nos). The Unit should include inbuilt MS stand/tray to hold min 5 numbers of mobile phones under charge. Enclosure material made of mild steel and powder coated including internal wiring by 2.5 sq.mm multistrand copper wire in an approved manner as directed by Engineer incharge at site.	Nos.	16	5164.00	82624.00
23	Supply & erection of 5Mtr high octagonal pole with double arm model no. BOP-5030 of Bajaj or similar, pole shaft material S355J0 or equivalent as per IS, hot dip galvanized steel octagonal pole with galvanized base plate of 200x200x12 mm, junction box with 6 Amp. MCB and stud terminals (for mounting inside the base compartment of pole), foundation bolt size 4x16mm dia. 600 mm in length including excavation and making foundation as per spec. and drawing. It shall be galvanized by single dipping method. The pole and foundation to be made as per spec & attached drawing.	Nos.	30	8595.00	257850.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
24	Supply of compact body LED street light 70W / 72W outdoor type complete with all accessories and integral electronic driver. Reputed make like Orient, Crompton, Phillips, Surya, Havells, Jaguar Halonix, Bajaj, Wipro and Eveready. Minimum 5 years warranty.	Nos.	140	4076.00	570640.00
25	Supply of LED flood lights 100W, outdoor type complete with all accessories & driver. Reputed make like Orient, Crompton, Phillips, Surya, Havells, Jaguar, Halonix, Bajaj, Wipro & Eveready. Minimum 5 years warranty.	Nos.	40	3900.00	156000.00
26	Fixing of LED Street light / flood light outdoor type with all its accessories as per site requirement and Engineer in charge of railway.	Nos.	180	119.00	21420.00
27	Supplying, fixing and commissioning of street light fitting accessories e.g. GI pipe of suitable bore as per fitting, clamps, nuts, bolts, cable, etc. as per instruction of site engineer.	Nos.	120	142.00	17040.00
28	Supply of material, foundation bolts etc. and casting of foundation suitable for 5 Mtrs pole with cement concrete ratio 1:2:4 as per technical specification and satisfaction to site engineer. (Supply of Octagonal Poles are not included in this NS)	Job	80	2539.00	203120.00
29	Erection of octagonal Pole with fixing and installation of street light fittings as instructed by site engineer including labour charges and other expenditure.	Nos.	80	531.00	42480.00
30	Supply and fixing of hot dip galvanized second arm of suitable length on existing octagonal pole as per site.	Nos.	50	894.00	44700.00
31	Removal of existing octagonal pole from p/f surface area & making the surface good by suitable cement concrete and transportation of pole and all accessories with fitting etc. complete from the site to place located at the station as advised by concern SSE/Elect.	Nos.	80	156.00	12480.00
32	Removal of existing Rail/Swage poles with overhead wire and all accessories from station area. Rail are to be cut 0.5m below the ground level & making the ground level good by suitable cement concrete and transportation of rail pole and all accessories with fitting etc. complete from site to place located at that station by concern SSE/Elect.	Nos.	10	559.00	5590.00
33	Supplying and drawing FR PVC insulated & unsheathed flexible 3 Core X 1.5sqmm PVC Unarmoured copper cable ISI marked (IS:694) of 1.1 kV grade and approved make in existing surface or recessed conduit/casing capping including making connections etc. as required.	Mtrs.	1500	51.00	76500.00
34	Supplying, fixing, testing and commissioning of wall mounted, single phase, 230 volt 50 Hz Air circulator fan of 600mm sweep size. It includes installation of fan along with required accessories as per site requirements. Fan should be of reputed make.	Nos.	130	8999.00	1169870.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
35	Supply and fixing of hot dip galvanized cover / plate of suitable size for covering the junction point in poles (5 / 7 mtr.) as per site requirement.	Nos.	250	566.00	141500.00
36	Supply and fixing of Double Door MCB TPN DB SP (8+12 module), neutral and earth link, 4 way with one no. four pole MCB 63 amp, one no. Four Pole RCCB 63 amp 30 mA and twelve no. SP MCB 32/25/16/10/6 amp. 'C' series. Breaking capacity not less than 10 kA. MCB, RCCB and DB should be of same make.	Nos.	20	9245.00	184900.00
37	Supply, installation, testing and commissioning of SPN DB 12 Way with suitable IP protection having 1 No. RCBO 40 Amp Cap., sensitivity 30 mA in the incoming and in outgoing 06 Nos. 10-32 Amp. SP MCB, 10 kA, 'C' curve, 10KA as required with bus bar, neutral bar and necessary wire sets. MCB, RCBO and DB should be of same make.	Nos.	20	7337.00	146740.00
38	Supply, fixing, testing and commissioning of single phase, 230 volt 50 Hz operating ventilation fan of 300 mm. sweep with louver shutters. Fan should be of reputed make.	Nos.	20	2176.00	43520.00
39	Supply of 4 x 16 sq. mm, 1.1KV grade, LT XLPE insulated PVC outer sheathed aluminium conductor armoured cable confirming IS: 7098 (Part-1) and as per tech spec. Reputed make like KEI, Polycab, Finolex, Havells or similar.	Mtrs.	9500	149.00	1415500.00
40	Supply of 4 x 50 sq. mm, 1.1KV grade, LT XLPE insulated PVC outer sheathed aluminium conductor armoured cable confirming IS: 7098 (Part-1) and as per tech spec. Reputed make like KEI, Polycab, Finolex, Havells or similar.	Mtrs.	6500	257.00	1670500.00
41	Laying, testing, commissioning & transportation of LT cable in Air / Pole / Pipe / Trench / wall / cable tray etc. with complete lugs / glands & clamping arrangement including transportation of cable as per site requirement.	Mtrs.	16000	21.00	336000.00
42	Digging and filling of trench size 0.4 x 0.8 mtr as per spec. (trench work may be on kachha / pakka land and all type of soil as per site requirement and without protective layer of brick) Surface of trench shall be made good in all respect and satisfaction of site engineer.	Mtrs.	15800	39.00	616200.00
43	Cutting of cement concrete floors (PCC / RCC), any type / depth as required for laying of UG cables in trenches and disposing off the excavated material as directed including refilling the trenches in layers and consolidating complete all as specified and directed. Note:-Providing barricading and danger lighting around the excavated areas safety precaution is a mandatory requirement and cost of this provision, wherever required, is deemed to be included in the quoted rate of this item.	Cum	800	1116.00	892800.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
44	Supply of HDPE pipe conforming to IS 4984:2016, 50mm dia, wall thickness 3mm, PN-6, PE-80 as per requirement.	Mtrs.	16000	65.00	1040000.00
45	Laying of HDPE pipe conforming to IS 4984:2016, 50mm dia, wall thickness 3 mm, under the road. The work involves laying of HDPE pipe along with transportation.	Mtrs.	16000	8.00	128000.00
46	Supply and fixing of junction box size 390x305x170mm comprising of SMP/FRP material with rubber gasket, padlock arrangement, zinc passivated earth bolt, etc. similar to Sintex model no. GSJB 3525 or similar with 4 no. aluminium busbar cap 200 Amp., suitable for 415 volt supply requirement. The box shall be fixed robustly with clamps at pole / wall as per requirement. All the material should be of good quality.	Nos.	130	2086.00	271180.00
47	Supply and fixing of junction box size 500X450X100mm comprising of sheet steel 2mm thick, 60 micron powder coating / two coats of primer and finished by enamel paint - grey shade, with gland plates, neoprene EDPM/rubber gasket, padlock arrangement, zinc passivated earth bolt, canopy etc. with 4 no. aluminium busbar cap 200 Amp., suitable for 415 volt supply requirement. The box shall be robustly fixed with clamps at pole / wall as per requirement.	Nos.	65	3428.00	222820.00
48	Supply & provision of cable marker. The cable marker shall be made of MS Sheet 1.5mm thick size 150X100mm welded with 12mm dia MS rod 85 cm long. The lower end of rod should be turned in hooks shape and attached with the cable at the time of laying.	Nos.	200	162.00	32400.00
49	Supply, laying and fixing of GI pipe medium "B" class (Blue) confirming to IS 1239 part-I for passing incoming and outgoing cable from ground through it size 38 mm dia. Pipe should be of reputed make.	Mtrs.	390	139.00	54210.00
50	SITC of 4 meter length B Class 50 mm dia GI pipe earth station with digging pit & refilling with charcoal & salt. (As per specification)	Nos.	160	1365.00	218400.00
51	Construction & supply of earth pit CC furnished chamber 300 x 300 x 250 mm, 50 mm thick with CI/RCC earth pit cover 300 x 300 x 25 mm with lifting hooked in center.	Nos.	160	589.00	94240.00
52	Supply, laying and fixing of 25 x 5 mm GI earth strip at 0.5 metre below ground level or on walls/poles / along pipes etc, including connection / termination with GI nut, bolt, washer etc as required (jointing shall be done by overlapping and with 2 sets of GI nut bolt & spring washer spaced at 50 mm). Note:- Suitable GI saddles with screws shall be provided to secure earth strips run on walls / floors etc.	Mtrs.	960	149.00	143040.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
53	Supply & Fixing of GRP / FRP cable tray made of glass fiber reinforced polyester moulding composite material, size 200 mm width x 75 mm depth min., 4mm 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 site requirement.	Mtrs.	2100	629.00	1320900.00
54	Supply of material and laying of perforated GI cable tray of size 100mm X 50 mm with cover and all fixing arrangements as per specification and as per site requirement & technical spec.	Mtrs.	800	381.00	304800.00
55	Supply, installation, testing and commissioning of 50 mm height and 200 mm width GI hot dip perforated cable tray with cover and all required mounting accessories as per site requirement & technical spec.	Mtrs.	700	501.00	350700.00
56	Supply, installation, testing and commissioning of 50 mm height and 300 mm width GI hot dip perforated cable tray with cover and all required mounting accessories as per site requirement & technical spec.	Mtrs.	500	1051.00	525500.00
57	Supply, fixing, testing and commissioning of fabricated feeder pillar distribution box made of MS sheet 1.6 mm thick size 600mmX300mmX600mm with suitable MS stand copper bus bar of 200 Amp. capacity and 2X63 Amp MCB four pole as per technical spec.	Nos.	5	6063.00	30315.00
58	Drilling of horizontal bore below Track/Road by pushing method (trenchless technology) for laying of RCC/HDPE/DWC pipe of various sizes up to 200 mm dia. in presence of Railway representative taking all necessary safety precautions related track and movement of trains. Horizontal boring will be done at min 1.5 Mtr. below from ground level at railway tracks.	Mtrs.	1700	1128.00	1917600.00
59	Supply of HDPE pipe conforming to IS 4984:2016, 110 mm dia, wall thickness as per IS, PN-6, PE-80.	Mtrs.	1700	342.00	581400.00
60	Transportation, installation, testing and commissioning of water cooler including, water connection, angle valve, etc. as per site requirement.	Nos.	20	2604.00	52080.00
61	Provision of suitable foundation with concrete and cement (size 1M x 1M) for water cooler of required height as per site requirement and as per instructions of site supervisor of railway.	Nos.	20	2074.00	41480.00
62	Supply & fixing of M.S. Jaali 1" x 1" welded on MS angle frame 30 x 30 x 3mm which is fixed on base angle frame on 50 x 50 x 6mm and 40 x 6mm MS flat in centre to support the jaali. The whole structure including the framed jaali painted with one coat of red oxide and two coats of enamel paint. Providing roofing on rail/iron structure by MS/GI sheets with support of 50 x 50 x 6mm angle, nut-bolt and washer as per requirement.	Kg	2000	69.00	138000.00
63	Supply, fixing, testing and commissioning of RCBO 25A, double pole, 30mA with Earth leakage, overload and short circuit protection as per spec.	Nos.	20	2564.00	51280.00

SN	Description of work	Unit	Qty	Unit Rate	Amount
64	Supply, fixing, testing and commissioning of RCBO 63A, Four pole, 30mA with Earth leakage, overload and short circuit protection as per spec.	Nos.	10	2841.00	28410.00
65	Supply and fixing of 4 / 8 module metal enclosure for fixing of RCBO, suitable for flush mounting and surface mounting with door for IP-54, similar to Legrand model no. 5077 91/93 of reputed make.	Nos.	30	663.00	19890.00
66	Supply and fixing of MCB DP 32 Amp as per relevant IS / IEC with box. Breaking capacity not less than 10 kA.	Nos.	20	1369.00	27380.00
67	Supply, Installation, Testing & Commissioning of MCCB 4P, 100A, 16kA, Thermal & magnetic adjustable as per relevant IS / IEC.	Nos.	14	4031.00	56434.00
68	Supply, Installation, Testing & Commissioning of MCCB 4P, 63A, 16kA Thermal & magnetic adjustable as per relevant IS / IEC.	Nos.	14	3811.00	53354.00
69	Supply and fixing of metal enclosure, powder coated, of reputed make for above MCCBs of 100A and 63A.	Nos.	28	535.00	14980.00
70	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. as per tender specs.	Sqft	1950	2139.00	4171050.00
71	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. as per tender specs.	Sqft	1950	214.00	417300.00
72	Laying of Spun/MS/GI/HDPE pipe 100mm to 200 mm by push through method in Railway yard / below track / Road.	Mtrs.	310	443.00	137330.00
Schedule-A (Amount in Rs.)					2,41,93,552

Note :-

1. Rates are inclusive of GST as applicable and all other taxes & applicable expenses.
2. The work should be carried out as per I.E. Rules and regulation and code of practice.
3. All materials such as wires, switches, CI/GI pipes, etc. should be ISI marked. Materials other than ISI marked should be as per technical specification and confirming to IS specification.
4. The tender offer submitted should be complete with financial status, previous experience, and other documents.
5. Contractor/s is/are bound to execute formal agreement on the documents available in this office.

**Sr. Divisional Electrical Engineer / G
N. W. Rly / Bikaner**

SPECIAL TERMS & CONDITIONS OF CONTRACT

- 1** The tenderers shall possess valid electrical contractor's license (issued by Govt. Electrical Licensing Board) and shall submit along with tender document.
- 2** The schedule of rates and quantities enclosed should be read in conjunction with the explanatory notes given in the tender papers.
- 3** Contractor shall offer all reasonable facilities to the authorized representatives of the Railway for various inspections and testing and submit test report jointly signed by the firm and Electrical Supervisor of Railway.
- 4** Water / electricity / transport shall be arranged by the Contractor at his own cost. The Purchaser shall not provide the same under any circumstances. The site for depot / workshop can be provided temporarily to the Contractor on his request.
- 5** The Contractor shall arrange at his own cost, all tools & plants, facilities required for erection, testing and commissioning of all the equipment in compliance with the respective tender specifications.
- 6** 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.
- 7** The work has to be carried out in Railway premises, so every precaution and safety rules shall be taken & followed by firm/contractor to protect their labours, Railway employees, passengers, materials, structures etc. as per Section-V Safety Precautions (attached).
- 8** The work shall be carried out as per the Indian Code of Practice for electrical wiring and fitting in the building.
- 9** All materials used shall comply with the latest IS/IEC Specification.
- 10** The staff deployed at work site should have proper and adequate tools & tackles & M&Ps to execute the work.
- 11** The contractor has to adopt all required safety measures & IE Rule during the execution of the work.
- 12** The electrical work shall be carried out in accordance with the approved standard of general electrical work in central government buildings.
- 13** The electrical work shall be carried out without interruption of the power supply for carrying out of work, if any power blocks are required, it will be restricted to shortest period as authorized by Sr. Divisional Electrical Engineer or representative authorized by them.

- 14** After completion of Electrical work the contractor will undertake the Civil Engg. Work to repatch the wall plaster and fill up the recesses etc. in the wall occurred during dismantling of old wiring and rewiring/fitting of the same.
- 15** Released material:- All the released material such cables, fittings etc dismantled by the contractor shall be deposited by him in the office/store of concern depot.
- 16** The work shall be carried out strictly as per latest Indian Electricity Rules.
- 17** The work shall be carried out in best workman like manner and any defect in the work of changes in the design etc. as pointed out by Inspecting authority shall be carried out by the contractor within quoted rates.
- 18** In case of any dispute regarding the lay out and any other electrical technical matter, the decision of Sr. Divisional Electrical Engineer will be final and binding on the contractors.
- 19** Any sample, if necessary, may be sent by Railway's representative to manufacturer/test house for ascertaining originality/parameters as per specifications and cost of test shall be borne by the contractor.
- 20** If any minor alterations are found necessary the contractor will do the same within the quoted rates.
- 21** Connection of earth electrode with earth continuity conductor must be properly secured by providing washer/spring washer of suitable size with nut and bolts (4"x1/2" hexagonal head).
- 22** Grommet & Cable alley:- All the cables and wiring shall be with proper cable alley and grommets etc.

**Sr. Divisional Electrical Engineer / G
N. W. Rly / Bikaner**

TECHNICAL SPECIFICATIONS AND OTHER CONDITIONS

E-TENDER NO. 04-EL-BKN-E-Tender-26-27

- 1.0 Name of work:- Electrical work in c/w augmentation of PF shelter at 13 Nos. NSG-5 stations (Keshrisinghpur, Lunkaransar, Mahajan, Napasar, Nohar, Rajaldesar, Raman, Sadulsahar, Sangaria, Satnali, Sri Dungargarh, Sri Karanpur, Tehsil Bhadra) of Bikaner Division (Total 64 Bays at 22 PFs).**
- 2.0 Inspection of material:**
- 2.1 All material shall be procured from RDSO / CORE approved vendors wherever approved sources are available / should be ISI marked of reputed brand and as per technical specifications given in tender document.
- 2.2 All the equipment, material, fittings etc. shall be subjected to inspection by RDSO / RITES / Railways. The inspection authority (RDSO / RITES / Railways) will be nominated by Sr. DEE (G), normally in accordance with Rly. Bd. letter no. 2000/RS(G)/379/2 dt. 06.09.2017 (Pre-inspection of material by RITES/RDSO – Minimum value of Stores). However, in the event of exigencies, Railway reserves the right to change the inspecting authority from RITES / RDSO to Consignee / Railway representative.
- 2.3 The contractor will seek nomination of inspecting authority & inspection site from Sr.DEE(G) duly submitting the details of order given to concern vendor.
- 2.4 RITES / RDSO inspection charges shall be borne by the Railways. However, the process of applying for inspection on online portal of inspecting agency shall be done by firm.
- 2.5 Inspection of material may be done at manufacturer's premises / manufacturer's test facilities / Contractor's Depot / work site as decided by Sr.DEE(G).
- 2.6 Contractor shall provide at his own cost all necessary assistance, T&P and bear the cost for carrying out testing of material at nominated location as per requirement
- 2.7 Any sample, if necessary, may be sent by Railway's representative to manufacturer/test house for ascertaining originality/parameters as per specifications and cost of test shall be borne by the contractor
- 2.8 The firm shall submit list of items along with make, model, tech specs with catalogue for approval in the office of Sr.DEE/G/BKN. For any items decided by Railways, sealed samples shall have to be submitted by firm to site engineer and it will be approved from ADEE/DEE/Sr.DEE/G/BKN.
- 2.9 Pre commissioning test if needed on various equipment may be carried out jointly by the contractor
- 3.0 Progress and time of completion**
- 3.1 The work will commence immediately after receipt of the detail acceptance letter and currency of contract is **06 Months (Six months)** from the date of issue of advance acceptance letter.
- 3.2 The agreement is to be signed within SEVEN DAYS after receipt of detailed acceptance letter.
- 4.0 Completion Test**
- On completion of installation, the following tests confirming to the relevant I.S. specification & I.E. Rules shall be carried out.
- a) Insulation resistance test.
- b) Polarity test of switches.
- c) Earth continuity test.
- d) Earth resistance test.
- 5.0** If any damage is caused to the coach / railway structure as result of execution of electrical work, it shall be the responsibility of the contractor to repair/make good the loss promptly at his own cost to the entire satisfaction of the Electrical Engineer/Supervisor In charge.
- 6.0** All the waste material shall have to be removed on the same day after execution of work, by the contractor.
- 7.0** All the rejected material should be removed from the site immediately by the contractor.
- 8.0** No part of work shall be got executed from any alternative Agency.

9.0 Bad workman ship pointed out by the Sr. Divisional Electrical Engineer In charge or his representative shall be rectified by the contractor at his own cost.

10.0 The contractor shall sign the site order.

11.0 Nomenclature of Equipment/Material

11.1 Switches, socket, batten holder, ceiling rose, flush type fan regulator etc. electrical accessories should be ISI marked of reputed make with brass or superior metal terminals.

11.2 Hard wood plug : These shall be of well-seasoned of size not less than 50 mm long, 25 mm square on the inner 20 mm square on the outer end. PVC gitti of suitable size may be used if required.

11.3 All the wooden screws shall be flat hard duly counter shunk and electroplated.

11.4 Ceiling Rose: This shall be 3 plate 5/6 Amp. 250 volt, ISI marked.

11.5 Connection to ceiling fans : For giving connection to ceiling fans, twisted twin PVC insulated copper conductor flexible cords minimum size 16/0.2 mm shall be used which shall hanged from ceiling rose to points connection on ceiling fans body.

11.6 5/15 Amp. Sockets piano type ISI marked.

11.7 Top cover on MS board shall be sunmica 3 mm thick.

11.8 The wires for concealed wiring shall be ISI marked.

11.9 Switch piano type one way, 5/6/15 Amp. 250 volts, ISI marked.

12.0 Inspection

After completion of work, the same shall be inspected by the Sr. Divisional Electrical Engineer, or his representative for the quality, and completion of the work.

13.1 Miniature Circuit Breakers (MCB)

- The MCB shall comply to IS:8828 / IEC 60898.
- The MCB housing shall have unique property of di-electric strength, arc resistance, insulation, flame retardancy and temperature resistance.
- The MCB shall have Minimum Breaking Capacity of 10kA as per IS/IEC 60898.
- The MCB shall be of Minimum Energy Limiting of Class 3.
- The MCB shall have Trip free mechanism.
- The MCB shall have Dual Termination on both sides.
- The MCB shall have True contact position indicator.
- The MCB shall have rated impulse voltage of minimum 4kV.
- The MCB shall have electrical life of 20,000 electrical operating cycles (up to 32A) and 10,000 operating cycles (40A-63A).

13.2 12 way double door SPN DB

12 way SPN DB having IK-08 protection (conforming to Legrand Cat. No.607702 or Similar) having one no. RCBO of 40 A Cap. Sensitivity 30 mA (conforming to Legrand Cat. No.007867 or similar) in the incoming & having 06 Nos. SP MCB 10- 32 A. SP MCB all MCB used should be of 'C' curve – 10 kA having 35 Sq.mm incoming and outgoing terminal capacity, insulated sliding shutters at terminals for safety, two position DIN rail clamps & ISI marked (conforming to Legrand Cat. No.603234 & 603237 or similar).

14.0 FIXING OF CEILING FAN/TL Fitting

The ceiling fan/TL Fitting shall be fixed and commissioned and connected with cord flexible three core copper wire in PVC flexible conduit pipe properly any discrepancy occurred in engineering work during the fixing of the ceiling should be restored in the original condition by contractor at his own cost.

15.0 MODULAR FAN REGULATOR

Supply and providing modular type BLDC electronic fan regulator 5-step type suitable for BLDC fan on existing board and connection as per Railway requirement. The regulator is made of high-grade, UV-stabilized polycarbonate material, specifically designed to support all brands BLDC fans.

16.0 ELECTRICAL WIRING

Wiring of SUB-MAINS

Wiring of sub-main with single core insulated, multi-stranded 3 x 2.5 / 4 / 6 sqmm flexible PVC insulated ISI marked Copper wire 1100 volts grade wire for phase, neutral and earth shall be laid / done in concealed with heavy duty ISI marked PVC Conduit pipe, minimum 25 mm dia and thickness 1.5 mm along with bend / junction, inside PVC duct/ conduit 25 mm as per instruction of site Engineer. Wire shall be ISI marked confirming to relevant IS specifications and make of reference list shall be used. The sub wiring shall be done in such fashion that minimum conduit pipes run inside the room as far as possible. The contactor shall dismantle existing /old wiring completely in case it is replaced with new wiring. Samples of all wiring items shall be got approved from Railway before installation. The copper wire used for earthing purpose shall not be less than wire used for phase wiring. There should be no loose connections and joints in the wiring circuit. The PVC conduit shall be properly fixed with the help of MS clamps/rawl plugs as per the instructions of site Engineer. The contractor will be responsible for proper plastering and distempering / fixing of tiles to restore the original finish of wall such that it matches with original surface and color of wall on which conduit pipe has been laid. Bends or flexible conduits should be used as per the site requirement. The wiring should be in well dressed up manner. Any discrepancy occurred in engineering work during the wiring should be restored in the original condition by the contractor, at his own cost. All metallic parts, fittings etc. shall be connected to the earth wire.

PVC / MS Conduit Pipe

Supply and fixing of PVC conduit/casing capping (as per instruction of site supervisor) and its accessories, size 25 mm, thickness 1.6 mm As per IS 9537 part III. Supply and fixing of MS conduit with its accessories, size 25 mm dia, thickness 1.6 mm as per IS 9537 part II.

Proper socket tee, jointing box at required places is to be used in fixing conduit with good workmanship. PVC bends are to be used in place of tee and junction boxes are to be used at junction point of two or more pipes during concealed wiring.

5/6 Amp MOULAR SOCKET

Supply and fixing 5/6A plug 3/5-pin 230V or above modular type switch socket on existing board and connection with suitable PVC CU cable. A switch for controlling power supply of plug shall be connect in phase wire and earth wire size shall be same size of wiring to flow maximum fault current.

15/16 Amp MOULAR POWER PLUG

Supply and fixing modular type 15/16A plug 5/6-pin power plug 230V or above and switch modular type with metal box concealed in wall and connection with suitable PVC CU cable. A switch for controlling power supply of plug shall be connect in phase wire and earth wire size shall be same size of wiring to flow maximum fault current.

Multistrand Copper Cable

It should be of voltage grade 1.1 kV conforming to IS: 694-1990 with **FR PVC compound insulation** and electrolytic grade, bright plain annealed copper conductor as per IS: 8130-1984.

Metal Box

Supply and fixing 2/4/6/8/12 module modular plates for fixing of switches and sheet metal box of good quality concealed fixing of MS box.

Wiring

The wiring work shall be done strictly as mentioned in the SOR description. No joint in wiring is allowed.

17.0 FAN REGULATOR

Supply and providing BLDC electronic fan regulator 5-step type suitable for BLDC fan on existing board and connection as per Railway requirement. The regulator is made of high-grade, UV-stabilized polycarbonate material, specifically designed to support all brands BLDC fans.

18.0 Supply, fixing, testing & commissioning of RCBO

Supply, fixing, testing and commissioning of RCBO Double pole. Confirming to IS / IEC 61009 or latest, sensitivity 30mA with connections capacity 25 A, 50Hz AC on existing/separate main board as per site requirement. The RCBO to be connected in the existing/Separate board as per requirement by making proper connection in the main board and fixing the RCBO. Any alteration in the wiring of main board if required is to be done by the contractor. The features of RCBO should have inclusive of following features: (a) Isolation with positive break indication. (b) Immune to nuisance tripping due to transit over voltage (Lighting, switching surges) (c) Trip indication. Material should be of reputed make.

19.0 Transportation, making foundation for water cooler and Installation of water coolers:-

Transportation and Installation of water coolers (Water cooler will be supplied by Railway). The contractor will transport the water cooler from concerned SSE store depot to site at his own cost. The contractor will carry out the required masonry work and pipe connection with angle valve from water point available near the water cooler as per satisfaction of site Incharge. Provision of suitable foundation with concrete and cement (approx. size 1Mtr X 1Mtr) for placement of water cooler at proper height for ease of drinking water as instructions of site supervisor of railway.

20.0 Octagonal Pole Foundation & Additional Pole Arm:-

The size of foundation as per attached drawing. The arms of 500 to 1500 mm length are to be provided as per the site requirement and the instructions of railway site engineer. All the connecting terminals shall be properly tightened and crimped in order to avoid any loose connection. Earthing of pole through armored of XLPE LT cable shall be done in proper manner as per the direction of site supervisor.

21.0 Earthing

Earthing should be as per I.S. 3043-1987 and should give desired value of resistance as per I.E. Rules. The location of earth electrode will be such where the soil has reasonable chance of remaining moist. As far as possible entrenches, permanent and road ways are to be definitely avoided for locating the earth electrodes.

Rail pole will be earthed by drawing a hole at 30 cm above muffing and with proper nut bolts. Earth wire will not be wrapped over the service pipe and conduit pipe.

As far as possible the earth pit should be provided as a suitable place below the service pole. The connected at the foot of the service pole by shortest route and then from foot to meter then from meter to meter **with 25x3 mm GI strip**.

The earthing of points (like 5/6 Amp. Sockets, 15 Amp. Socket Fan and fan regulator) and all metallic points are included in wiring and rewiring shall be earthed with 1.5 sqmm PVC insulated & unsheathed multistrand copper cable wherever required.

A plate of 14 SWG MS sheet size 150 x 100 mm painted with black enamel paint shall be fixed near the earth and following information shall be indicated (i) Earth No. (ii) Individual value of earth (iii) date of testing. The earth pipe shall be provided with GI cap to prevent blocking of the pipe.

The distance between two electrodes should not be less than eight meter and shall not situated within a distance of 1.5 meter from the building whose installation system is being earthed.

RCC / Cast-iron cover with cast iron frame 3mm thick shall be fixed on earth pit. The cover shall be fixed with 6.5mm thick hinged rod to the frame.

Earth electrode to be put vertically downward. The GI pipe should be tapered at one end. GI strip shall be used and connected from earth to main board / meter board / pole. The depth of strip in ground shall be minimum 30 cms. Value of each earth shall be measured after commissioning of earth.

22.0 Cable Laying Specification (General)

The cable shall not bent sharp to small radius. The minimum safe radius of all type of cables shall be taken as 12 times of overall dia meter of cable. The bending radius of individual cores of a multi core cable shall not be less than 15 times its overall diameter. As far as possible a larger radius should be adopted while deciding the route of cable shortest practical route fixed structures such as road, foot path are to be considered. The future widening of road, future maintenance identification etc. are also kept in mind. Cross country run to shorter the route length is not desirable as it would be create problems during later developed of area etc. Quality of soil, sewage effluent present and future requirement of other utilities cables of different voltage grade shall be kept in separate trenched unless space is limited. Higher voltage cable shall be laid in lower tier during the initial stage of laying of cable. Joint position shall be decided after consideration of carry way, permanent, proximity to telephone cable, water mains, inaccessible place, ducts, pits etc. Before laying of cable it should be tested for continuity and insulation.

Cable drum shall be properly mounted on the jacks or on a cable wheel at a suitable location making sure that spindle, jacks etc, are strong enough to carry the weight of drum. The cable shall be pulled over rollers in trench steadily and uniformly without jerks and strain. After the cable has been uncoiled and laid in the trench over rollers. The cable shall be lifted slightly over the rollers beginning from one end by helpers standing about 10m a point and draw straight. The cable should be taken off the rollers by additional helpers lifting the cable and laid in reasonably straight line. For short run and size upto 50 sqmm of cable any other suitable method of direct handing and laying can be adopted with consent of site engineer. The cable laid in trench in a single tire formation shall have a covering of clean, dry sand of not less than 10 cms, as base cushion of sand before protective cover is laid at the time of laying cable app. 3M cable at the ends and each side of underground joints left surplus for future use. The cable shall be protected by HDPE pipe.

Where more than one cable is laid in same trench. Horizontal formation of the cables laying more than one cable should be increased such that inter-axia distance between the cables must be 20 cm at least and brick is to be laid. There should be a clearance of at least 15 cm between axis of the end cable of side of the trench. Cable coming out from underground should be in GI pipe and GI must be clamped either on pole or wall by at least two clamps. Cable route tracers should be provided at each 10 mtr. distance and at the turns also.

Wherever it is necessary to lay the cable in air/open space the same should be done by providing proper cable alley/grommets etc.

Laying of cable -

Laying, testing, commissioning & transportation of LT cable in Air/Pole/Pipe/Trench/wall/cable tray etc. with complete lugs/glands and transportation of cable etc. Laying cable in air with fixture (02 nos. per mtrs).Cables shall not be bent sharp to a small radius while handling or during installation. The minimum safe bending radius for PVC/XLPE (MV) cables shall be 12 times the overall diameter of the cable. Cable should be properly terminated with standard size of lug. The cable along the wall should be provided with suitable size of M.S. clamps, Reg Bolts / J bolts shall be provided to supporting the cable. The distance between two supports not more than 0.50 meters. Breaking of wall to make holes for the contractor shall do cable entry in the building shall be restored to original levels to the satisfactions of the railway.

All the instruments required for insulation testing/ high voltage testing shall be arranged by contractor at his own cost. Transportation of the cable is to be done by contractor from main depot to required site.

23.0 Trenching

The minimum width of trench for laying single cable shall be 0.4 m x 0.8 m in case of LT cable. The depth of trench is increase to 1.2 M in case of cable above 1.1 KV. Adequate precaution should be taken not to damage any existing cable, pipe or other such installation in the proposed route during excavation. The bottom on trench shall be level and free from stones, bricks bats etc. The trench shall then be provided with a layer of clean dry sand cushion of not less than 10cm in depth. The trench shall be than back filled in with excavated earth free from stone and other sharp edged debris and shall be rammed in successive layers not exceeding 30 cm up to top. The cable shall be protected by HDPE pipe as a protection cover.

In case of more than one cable in a trench additional brick layer is to be laid between cables to maintain interaxia distance.

24.0 Standard Makes

- 24.1 All items endorsed by BEE under star rated labeling scheme should be BEE approved make.
- 24.2 Items for which RDSO specifications are available at the time of issue of NIT and mentioned in NS item of schedule, such items will be taken as per clause by clause compliance of RDSO specification.
- 24.3 Items not covered in above para should be ISI marked of reputed brand and as per technical specifications given in tender document.

25.0 Contractor shall also employ following Qualified Engineers during execution of the allotted work:

- 25.1 One Qualified Graduate Engineer when cost of work to be executed is Rs 200 lakh and above.
- 25.2 One Qualified Diploma Holder Engineer when cost of work to be executed is more than Rs 25 lakh, but less than 200 lakh.
- 25.3 GST/Sales tax octroi, Royalty, Toll Tax or any other taxes levied/leviable by the central or State Govt. Local Bodies shall be borne by the contractor. No such other taxes on contractor's labour or material will be paid by Railway. This should be kept in view while tendering.
- 25.4 The quantities given in annexure 'H' are approximate and are subject to variation plus/minus as per variation clause mentioned in GCC applicable at the time of opening of tender.

26.0 LED illuminated sign / direction boards in Elliptical Shape

LED Signage Board to be provided as per Railway Board Policy and prior approval to be taken from competent authority before provision of signage boards. 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 calendared vinyl of 70 µm 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 minimum 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 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.

The work covers Design, manufacture, display, installation of elegant, aesthetically appealing energy efficient LED Elliptical signages for passenger amenities areas like platforms, direction, FOB's, Service buildings, Utilities, concourse etc. 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.

Documentary proof of purchasing of LED / LED drivers / Vinyl sheet / Polycarbonate sheet from reputed approved brand to be submitted along with bill (if required).

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.

Agency shall visit the site for designing the signages, Design, model, graphics and colour scheme shall be got approved from user department before supply of LED Elliptical glow sign boards.

Agency shall submit the design report through professional design expert for appreciation of user department.

The quality of the Vinyl / Polycarbonate sheet/ anodized coating should 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.

27.0 Ventilation Fan

Supply, fixing, testing and commissioning of single phase ventilation fan with louver shutters. Fan should be of reputed make.

Sweep Size	300mm
ISI Marked	Yes
Rated voltage	230V, 50 HZ, AC, Single Phase
No. of blades	3 / 4
Standard installation accessories	To be provided
Louver shutters	Yes
Warranty	Two Years or more

28.0 Feeder Pillar

Supply, erection, testing and commissioning of feeder pillar size 600x300x600 mm fabricated from 16 SWG MS sheet (tolerance as per IS permitted) hut shape suitable for outdoor installation, painted/ with red oxide and enamel/ powder coated complete enclosed type dust and vermin proof, with gland plate in bottom as required including connecting incoming & outgoing cables with aluminum lugs and brass glands, with 63 Amp MCB and 4 nos. aluminum bus bars suitable for 200A, complete with locking arrangement with MS angle stand 2 feet height angle size 40 x 40 x 6 mm grouted in cement concrete mixture 1:3:6.

29.0 Perforated GI cable Tray 100X50mm / 200X50mm / 300X50mm

The contractor shall have to supply and fix the perforated GI tray on Wall / roof / as per site requirement for cable laying.

1. The fixing arrangement shall be robust and the fixing shall have to be done by Angle at an interval of minimum 1.5-meter, nut, bolt, clamp or welding on Wall / roof / as per site requirement.
2. Cable tray shall not be less than **100X50mm / 200X50mm / 300X50mm in size** and Cable tray perforation shall be as per relevant IS. The perforated cable tray shall be minimum **2 mm thick** with its cover shall be minimum **1.2mm thick**. In case non-availability of the required size next higher size can be used.
3. The cable tray shall be firmly fixed /supported on the Wall/ roof/as per site requirement.
4. The design & fixing arrangement shall have to be approved by Railway before fabrication and installation.
5. Provide proper clamping arrangement for cables laid on it. Including all fixing arrangements as decided by site engineer and as per requirements.

30.0 Tools and Plants

During the period of erecting, testing and commissioning the contractor shall make his arrangement for necessary tools and plants required for transportation, handling, erecting, testing and commissioning of various equipment at site of work covered under the contract.

31.0 LED Fitting 2 x 18W :-

Supply, erection, testing and commissioning of 2 x 18 W LED fitting complete with connection and necessary fixing arrangements as per site requirement. The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of surface and suspended mounted IP-66 / IP-65 protected water proof fitting complete with 2 nos. 18-20 Watt LED tube light complete with all accessories and fixing arrangement with clamps, brackets, nut bolts etc. as per site condition. The cost shall also cover the wiring from ceiling rose / junction box / overhead wire to luminaries by 1.5 sq.mm cable of 3 core PVC insulated multistrand copper conductor with suitable size of flexible PVC conduit and fixing arrangement with clamps, brackets, nut-bolts etc. The technical parameter will be generally conforming to specification and submit test certificates / reports as per this technical specification. Luminaire to be got approved by Railway before supply.

32.0 Definition of similar nature of works:-

Any electrical work related to HT/LT installations.

33.0 General Technical Requirements for LED Luminaires :-

Scope – This specification covers Design, Development, Manufacturing, Testing and Supply / supply & installation of Energy Efficient LED based Luminaires as well as LED Lamps along with Drivers.

Service Conditions: The LED Lamps, Drivers & Luminaires shall be suitable for Office Buildings / Railway Stations / Staff quarters and other Installations under the following Environmental Conditions.

Environmental Conditions:

Maximum ambient air temperature	50°C
Minimum ambient air temperature	-5°C
Maximum Relative humidity	90%
Atmosphere	Extremely dusty and desert weather, desert terrain in certain areas. The dust contents in the air may reach as high as 1.6mg/m ³
Salt Laden & Corrosive Area	The equipment shall be designed to work in humid, salt laden and corrosive area.

The maximum value of the condition in the Salt Laden and Corrosive area will be as follows

Max pH value	8.5
Sulphate	7mg/litre
Max. Concentration of Chlorine	6mg/litre
Annual rainfall	Ranging from 1750mm to 2000 mm with thunder storm.
Altitudes	Not exceeding 2000 m above sea level

Service Condition: The supplier shall provide “In the field service support” during guarantee period.

LM 79 test report in respect of LED luminaries of manufacturer shall be provided along with supply of material.

LM 80 test report of the LED Chip of LED manufacturer shall be provided along with supply of material. The illumination of luminaries will be uniform without dark bands or abrupt variations and smoothing to the eyes.

The illumination works on single phase three core wire system (Phase, Neutral & Earth). Length of 50cm 'ISI' marked three core wire shall be provided with LED luminaries & LED tube Fitting.
 Power Factor of luminaire shall be ≥ 0.90 at full load.
 The nominal voltage luminaire shall be 230 Volt AC $\pm 5\%$, 50 Hz.
 The input operating voltage of luminaire shall be 140V-270V AC.
 The tolerance limit of technical parameter wherever not given shall be applicable as per relevant IS/IEC.

LED / LED Light Source:-

SN	Description	Specification
1	LED Make	Nichia / Osram / Samsung / Lumiled / Cree / Seoul / Philips
2	LED Type	(a) For Street light, Highmast light, Low bay / Medium Bay / High Bay - High power LED (≥ 1 watt) (b) For LED blubs, LED tube light fittings – Low power LED (≤ 1 watt)
3	Lumen Output of LED	≥ 140 Lumen/Watt- For High power LED ≥ 110 Lumen/Watt- For Low power LED
4	Overall Lumen Output	≥ 100 Lumens/ Watt for LED light wattage upto 45W ≥ 120 Lumens/ Watt for LED light wattage above 45W
4	LED life Expectancy	$\geq 50,000$ burning hours (to be supported by LM 80 report & TM21 report of manufacturer of LED chip)
5	Beam angle of LED	As per requirement
6	Range of Color Temperature	For white color LED shall be 5700 K for Outdoor application & 6500 K for indoor application.
7	Color Rendering Index	≥ 70 - For street lights and high mast fittings ≥ 110 - For LED blubs & LED tube light fittings
8	LED	LED used should be of SMD type only.

LED Driver:-

SN	Description	Specification
1	Driver Type	Constant Current driver with short circuit & open circuit protection. The LED driver shall be required compulsory registration as per IS 15885 - 2012 or latest
2	THD (Current)	$< 15\%$
3	Driver Efficiency	Up to 100 Watt : $> 85\%$ (Minimum) Above 100 Watt : $> 90\%$ (Minimum)
4	Driver Components	Industrial grade or above Driver current should be less than rated current of component used to meet the rated life.
5	PCB	PCB shall be FR4 grade minimum 0.8-1.0 mm thick or more to be fixed with high thermal conductive paste or tape on the extruded. Aluminum heat sink for street light & high mast light for LED bulbs & LED tube light the same may be provided if required.
6	Driver Cut in & Cut off Voltage	The driver should be designed at cut in voltage & Cut off voltage to be suitable as per requirement of LED Light
7	Junction Temperature	Switching Device such as Transistors & MOSFETs etc. Shall not exceed 85 Deg C
8	Surge protection	1. Internal Voltage Surge Protection - To protect the luminaire form switching surges. The driver of all luminaries should have Internal surge protection of MOV of ≥ 3 kV (Metal Oxide Varister) 2. External (SPD) Surge Protection Device- (For Street light Fittings, Highmast Lights, Low

		Bay/Medium Bay/High Bay) External Surge protection of minimum 10 kV to be separately installed with the each fixture.
9	Potted Driver	Potting of LED driver: For driver power output rating \leq 50W, potted driver shall be preferable (but not mandatory). But for driver power output rating $>$ 50W, potted driver shall be a mandatory requirement.

At several places in this Specifications certificate from 'NABL accredited laboratory is called for. So, a clarification is required with regard to acceptability of certificates from laboratories outside India. It is clarified that wherever 'NABL accredited laboratory' certificate is called for, certificate from laboratories in foreign countries shall be acceptable if that laboratory is also existent and operational in India and if the same (i.e. the laboratory existent and operational in India) is accredited with NABL. In case of any other laboratory outside India, certificate issued by it can be accepted, if that laboratory is accredited with the national accreditation authority of the host country.

Technical Requirements of Luminaire

The lumen must have secondary lens/optics. Though the secondary lens/ optics does result in minor loss of lumens, it is nevertheless a must to distribute the light output of the LEDs so as to achieve the desired polar curve characteristics for the luminaire, No exemption shall be permitted on this account. The material of lens should preferably be PMMA.

Housing of luminaire : Pressure die-cast LM6/ADC12/LM24 housing.

Cover type: Toughened glass or UV stabilized polycarbonate cover.

Housing protection : IP-65/66 or better for outdoor application & IP-20 for indoor application. If the LEDs & LED driver are in different compartments, then the two compartments must be individually IP-65/66. Proper gasket should be provided.

Temperature Rise : When the luminaire has stabilized thermally, soldering point temperature of the LEDs must be equal to or less than 85°C. Temperature rise (above ambient) of heat sink should generally remain within 20°C – relaxation on this account can be granted as long as the soldering point temperature limit of 85°C is not violated and there is no unacceptable outcome.

GUARANTEE:

The complete LED luminaire shall have replacement guarantee for satisfactory performance and manufacturing defects for a period of 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier.

IDENTIFICATION:

The firm shall embossed / engraved firm name, month & year of manufacture, serial number, rated input voltage & wattage inside & outside the fittings/Boards and also screen print on LED Panel and LED Driver, the firm name & Year of manufacturing.

NOTE:-

These general technical requirements shall be applicable for all LED luminaires supplied in this work. However if any specific details are mentioned for any LED luminaire in the SOR description, the same shall be considered.

34.0 Warranty

Items for which the warranty offered by manufacturer is more than one year, contractor will submit the warranty card of the item duly filled in all respect to consignee.

- A The contractor shall warranty that all materials & equipment to be supplied and installed as per this tender shall be free from defects and faults in design, material, workmanship and manufacture and shall be of the highest quality and consistent with the established and generally accepted standard for materials of the type ordered and in full conformity with the contract specifications.
- B The contractor shall give warranty / provide maintenance for satisfactory working of all the equipment & installations erected & commissioned by him in this tender, for a period of ONE YEAR from the date of commissioning.
- C During the period of Warranty, the contractor shall keep available experienced engineer & technician and necessary equipment to attend to any defective installation. The Contractor shall bear the cost of all modifications, additions or substitutions that may be considered necessary due to faulty material, decision regarding this shall rest with the Sr.DEE/NWR/Bikaner.
- D During the period of Warranty, the contractor shall be liable for the replacement of any equipment & any parts which may be found defective, whether such equipment be of his own manufactured or those of his sub-contractor, whether defect arising from faulty design, material, workmanship or negligence in any manner on the part of the Contractor, at his (Contractor's) own expenses. In case of defect of similar type detected in contractor's equipment & components during the warranty period, the contractor shall replace complete lot of the items irrespective of the fact that whether all such items have failed or not. The Contractor shall bear the cost of repair carried out on his behalf by the Purchaser at site due to urgent requirement. In such a case, the Contractor shall be informed in advance of the repair proposed to be carried out by the Purchaser.
- E If it becomes necessary for the contractor to replace or renew any defective portion/s of the system under this clause, the provisions of this clause shall apply to the portion of equipment/component/system so replaced for further period of 12 months from the date of such replacement or renewal or until the end of the warranty period whichever may be later. If any defect is not remedied within reasonable time, the Railway may proceed to do the work at contractor's risk and expense, but without prejudice to any other rights, which the Railway may have against the contractor in respect of such defects.
- F The repaired or renewed part shall be delivered and erected on site free of charge to the purchaser.
- G The Railway shall have right for acceptance, rejection of materials at site if the same are not in accordance with the specifications.
- I The terms and conditions of this contract shall also be governed with G.C.C. of Railways.
- J The Contractor should submit a certificate citing abidance to 05 years warranty obligation for LED Signage Boards and 03 years for Vinyl / Polycarbonate sheet / anodized coating duly signed by the Contractor.

Before submitting the final bill, the successful Contractor has to submit warranty certificate on Stamp Paper of value Rs 200/- citing abidance to 5 years warranty obligation for LED Signage Boards and 03 years for Vinyl / Polycarbonate sheet / anodized coating duly signed by the Contractor and certified by Notary against any failure for LED Signage Boards & Vinyl / Polycarbonate sheet / anodized coating, etc. for a period from the date of passing of Final Completion Certificate for the work.

The contractor shall warranty that all materials & equipment to be supplied and installed as per this tender shall be free from defects and faults in design, material, workmanship and manufacture and shall be of the highest quality and consistent with the established and generally accepted standard for materials of the type ordered and in full conformity with the contract specifications.

Others item which warranty not given by manufacturer, the contractor shall give warranty / provide maintenance for satisfactory working of all the equipment's & installations erected & commissioned by him in this tender, for a period of ONE YEAR from the date of commissioning.

During the period of Warranty, the contractor shall made available experienced engineer & technician and necessary equipment to attend to any defective installation on call basis. The Contractor shall bear the cost of all modifications, additions or substitutions that may be considered necessary due to faulty material, decision regarding this shall rest with the Sr.DEE/G/NWR/Bikaner.

During the period of Warranty, the contractor shall be liable for the replacement of any equipment & any parts which may be found defective, whether such equipment be of his own manufactured or those of his sub-contractor, whether defect arising from faulty design, material, workmanship or negligence in any manner on the part of the Contractor, at his (Contractor's) own expenses. In case of defect of similar type detected in contractor's equipment & components during the warranty period, the contractor shall replace complete lot of the items irrespective of the fact that whether all such items have failed or not. The Contractor shall bear the cost of repair carried out on his behalf by the Purchaser at site due to urgent requirement. In such a case, the Contractor shall be informed in advance of the repair proposed to be carried out by the Purchaser.

If it becomes necessary for the contractor to replace or renew any defective portion/s of the system under this clause, the provisions of this clause shall apply to the portion of equipment/component/system so replaced for further period of 12 months from the date of such replacement or renewal or until the end of the warranty period whichever may be later. If any defect is not remedied within reasonable time, the Railway may proceed to do the work at contractor's risk and expense, but without prejudice to any other rights, which the Railway may have against the contractor in respect of such defects.

The repaired or renewed part shall be delivered and erected on site free of charge to the purchaser.

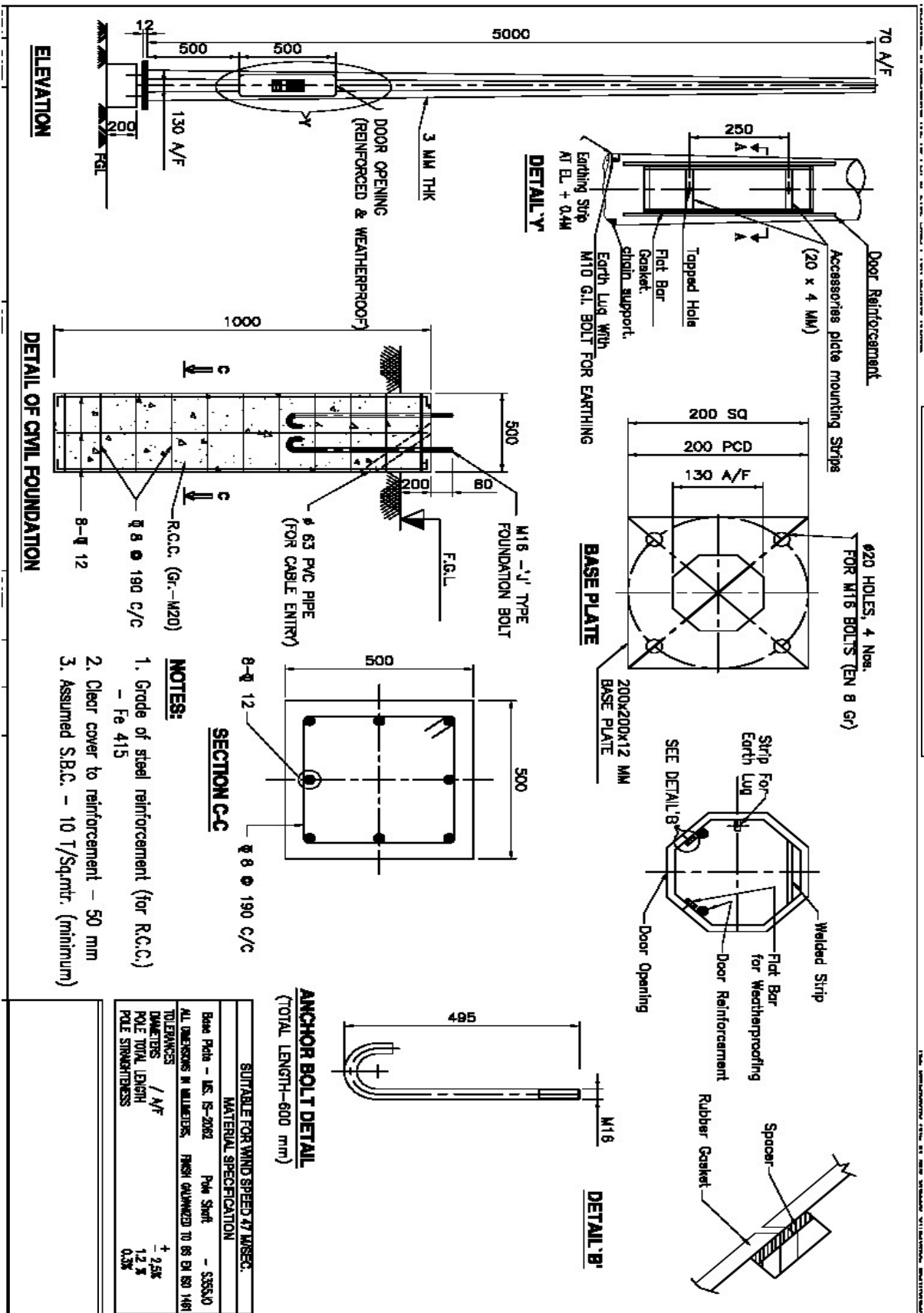
However SD will be release to tenderer after completion of warranty period of 1 year.

35.0 Payment Terms:-

- 1. 70% payment will be made of NS items after receiving & acceptance of material at site for Schedule-A item no. 15, 17, 19, 23, 24, 25, 34, 36, 37, 39, 40, 44, 46, 47, 53, 54, 55, 56, 59 & 70.**
- 2. 20% payment will be made after successful installation of the above NS items.**
- 3. For other NS items, 90% payment will only be made after supply & installation of those NS items.**
- 4. 10% payment will be made after successful completion of work.**

**Sr. Divisional Electrical Engineer/G
N.W. Rly / Bikaner**

Octagonal Pole 5 meter



SECTION-V

SAFETY PRECAUTIONS

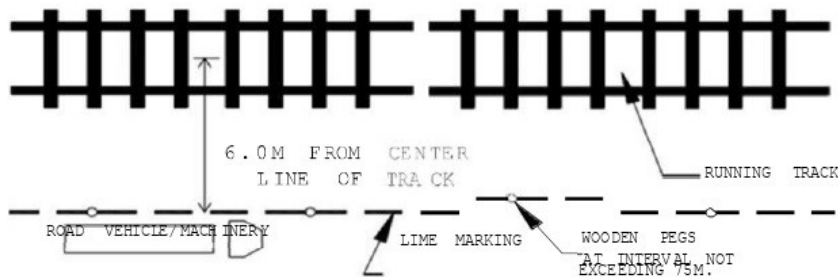
(Safety Precautions to be Taken during execution of work)

1.0 Safe working of contractors (Extract of para 826 of IRPWM) :- A large number of men and machinery are deployed by the contractors for track renewals, gauge conversions, doublings, bridge rebuilding, railway electrification etc. It is therefore essential that adequate safety measures are taken for safety of the trains as well as the work force. The following measures should invariably be adopted.

- (i) The contractor shall not start any work without the presence of railway supervisor at site.
- (ii) Wherever the road vehicles and/or machinery are required to work in the close vicinity of railway line, the work shall be so carried out that there is no infringement to the Railway's schedule of dimensions. For this purpose, the area where road vehicles and/or machinery are required to ply, shall be demarcated and acknowledged by the contractor. Special care shall be taken for turning/ reversal of road vehicles/machinery without infringing the running track. Barricading shall be provided wherever justified and feasible as per site conditions.
- (iii) The look out and whistle caution orders shall be issued to the trains and speed restrictions imposed where considered necessary. Suitable flagmen/detonators shall be provided where necessary for protection of trains.
- (iv) The supervisor/workmen should be counseled about safety measures. A competency certificate to the contractor's supervisor as per Performa annexed shall be issued by Engineer or his authorized representative, which will be valid only for the work for which it has been issued.
- (v) The unloaded materials for tender work after unloading from track should be kept clear off moving dimensions and stacked as per the specified heights and distance from the running track.
- (vi) Supplementary site specific instructions, wherever considered necessary shall be issued by the Engineer in Charge.

PLYING OF ROAD VEHICLES AND WORKING OF MACHINERIES CLOSE TO RUNNING TRACKS

- (i) Normally, the road vehicles shall be run or machinery shall be worked so as not to come closer than 6.0m from centre line of nearest running track.
- (ii) The land strip adjacent to running tracks, where road vehicle is to ply or machinery is to work, shall be demarcated by lime in advance in consultation with the Railway's Supervisor. Wooden pegs at interval not exceeding 75mts shall be provided along the line marking as permanent marks. The road vehicles shall ply or machinery shall work so as not to infringe the line of demarcation.



- (iii) If a road vehicle or machinery is to work closer to 6.0m due to site conditions or requirement of work, following precautions shall be observed.
 - a. In no case the road vehicle shall run or machinery shall work at distance less than 3.5m from centerline of track.
 - b. Demarcation of land shall be done by bright colored ribbon/nylon chord suspended on 75cm high wooden/bamboo posts at distance of 3.5 m from centreline of nearest running track.
 - c. Presence of an authorized Railway's representative shall be ensured before plying of vehicle or working of machinery.
 - d. Railway's Supervisor shall issue suitable caution order to Drivers of approaching train about road vehicles plying or machineries working close to running tracks. The train drivers shall be advised to whistle freely to warn about the approaching train. Whistle boards shall be provided wherever considered necessary.
 - e. Lookout men shall be posted along the track at a distance of 800m from such locations who will carry red flag and whistles to warn the road vehicle/machinery users about the approaching trains.
 - f. On curves where visibility is poor, additional lookout men shall be posted.
- (iv) **If vehicle/machinery is to be worked closer to 3.5m from running track.**

Under unavoidable conditions, if road vehicles or machinery is to ply or work closer to 3.5m due to site conditions or requirement of work, following precautions shall be observed:

a. Plying of vehicles or working of machinery closer to 3.5m of running track shall be done only under protection of track. Traffic block shall be imposed wherever considered necessary. The site shall be protected as per provisions of Para No. 806 & 807 of P-Way Manual as case may be.

b. Presence of a Railway's Supervisor shall be ensured at worksite.

c. Railway's Supervisor shall issue suitable caution order to Drivers of approaching train about road vehicles plying or machineries working close to running tracks. The train drivers shall be advised to whistle freely to warn about the approaching train.

(v) Precaution to be taken while reversing road vehicle along side the track.

The location where vehicle will take a turn shall be demarcated duly approved by Railway's representative. The road vehicle driver shall always face the Railway track during the course of turning/reversing his vehicle. Presence of an authorized Railway representative shall be ensured at such location.

(vi) Road vehicle shall not be allowed to run along the track during night hours generally. In unavoidable situations, however, vehicles shall be allowed to work during night hours only in the presence of an authorized Railway's representative and where adequate lighting arrangements are made and where adequate precautions as mentioned earlier have been ensured.

(vii) Road vehicles/machinery/plant etc. when stabled near running tracks shall be properly secured against any possible roll off and always be manned even during off hours.

EXECUTION OF WORKS CLOSE TO OR ON RUNNING LINES

(i) Any work close to or on running tracks shall be executed under the presence of a Railway's Supervisor only.

(ii) Precaution to be taken to ensure safety of trains while execution of work close to the running line or on running lines.

a. Such works shall be planned and necessary drawings particularly with regard to infringement to moving dimensions shall be finalized duly approved by competent authority before execution of work. The work shall be executed only as per approved procedure and drawings.

b. All temporary arrangements required to be made during execution of work shall be made in such a manner that moving dimensions do not infringe.

c. Suitable speed restriction shall be imposed or Traffic block shall be ensured as required.

d. The site shall be protected as per provisions of Para No. 806 & 807 of P-Way Manual as case may be

e. Necessary equipment for safety of trains during emergency shall be kept ready at site.

(iii) Precaution to be taken to ensure safety of electrical/signal/ telephone cables while excavating near tracks.

a. Particular care shall be taken to mark the locations of buried electrical/signal/telephone cables on the plans jointly with S & T/Electric supervisor and also at site so that these are not damaged during excavation.

b. Copy of the cable plan should be given to the contractor's authorised representative before handing over the site to start the work.

c. Due care shall be taken to ensure that any part of the equipment or machinery or temporary arrangement does not come close to cables while working.

(Ref: JPO issued by Railway Board vide letter no. 2003/Tele/RCIL/1 pt. IX dated 24.06.2013 (Telecom circular no. 17/2013) for undertaking digging work in the vicinity of signaling, electrical and telecommunication cable will be followed during the execution of work.)

(iv) Precaution to be taken during execution of works requiring traffic blocks.

a. Any work, which infringes the moving dimensions, shall be started only after the traffic block has been imposed.

b. Before closing the work, the track shall be left with the proper track geometry so that the trains run safely.

c. After completion of work the released sleeper and fittings should be properly stacked away from the track to be kept clear of moving dimensions.

d. Block shall be removed only when all the temporary arrangement, machineries, tools, plants etc. have been kept clear of moving dimensions.

(v) Precaution to be taken during execution of works during night.

The work close to running line, generally, shall be carried out only during day hours. At locations, however, where night working is unavoidable, proper lighting arrangement should be made and all safety aspects should be strictly observed. The engineering indicator

boards shall be lightened during night hours as per the provisions of P-Way Manual. The staff deputed for night working should have taken adequate rest before deploying them in night shift. We can specify duration of night shift from 20.00 hrs to 04.00 hrs. All other safety precautions applicable for daytime work should be strictly observed during night working.

(vi) Precautions to be taken to ensure safety of workers while working close to running lines.

- a. Necessary lookout men with red flags and whistles shall be provided to warn the workmen about the approaching train.
- b. Railway's supervisor shall issue suitable caution order to Drivers of approaching train for whistling to warn the workers about the approaching train. Whistle boards shall be provided wherever considered necessary.
- c. A "First aid kit" shall always be kept ready at site.

(vii) Precaution shall be taken for safety of public or passengers, while executing works at locations, used by passengers and public..

The worksite shall be suitably demarcated to keep public and passengers away from work area. Necessary signage boards such as "Work in progress. Inconvenience is regretted" etc. shall be provided at appropriate locations to warn the public/ passengers. Adequate lighting arrangement of worksite wherever required shall be done to ensure safety of public/passengers during night.

(viii) Precaution to be taken before stacking materials alongside the track to ensure that safety of trains is not affected.

The following precautions shall be taken before stacking the materials along the track for stacking of Electric poles, Cables, OHE masts, Contact wires, Catenary wires etc.

- a. The sites for material stacking should be selected in advance in such a manner to ensure that no part of the material to be stacked is infringing to the Standard Moving Dimensions. A plan of proposed stacking locations be made and signed jointly by an authorized Railway's representative and contractor's representative.
- b. The selected locations shall be marked by lime in advance.
- c. Presence of an authorized Railway's representative while unloading and stacking shall be ensured.
- d. The materials shall be stacked in such a height so as to not to infringe SOD in case of accidental roll off.

(IX) Precautions to be taken during working in RE areas – Necessary precautions to be taken during working in electrified / under electrification sections by contractor or his representative/staff (Ref: Elect. HQ office letter no. EL/Safety/2/power/Pt. III dated 20.11.2013.

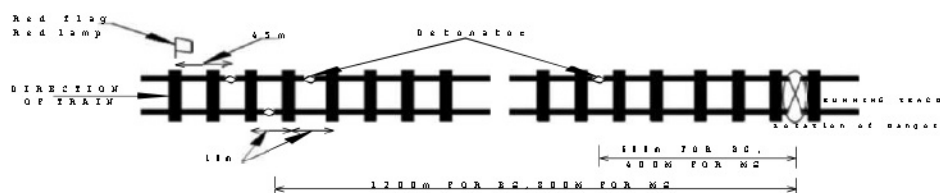
PROTECTION OF TRACK DURING EMERGENCY

(i) Action to be taken when a contractor's supervisor or vehicle operator apprehends any unusual circumstances likely to infringe the track and endanger safe running of trains.

At any time if a contractor's supervisor or vehicle operator observes any unusual circumstances likely to infringe the track and apprehend danger to safe running of track, he shall take immediate steps to advise a Railway official of such danger and assist him in protection of track.

The track shall be protected as under. One person shall immediately plant a red flag (red lamp during night) at the spot and proceed with all haste in the direction of approaching train with a red flag in hand (red lamp during night) and plant a detonator on rail at a distance of 600m from the place of obstruction of BG track (400m for MG track) after which he shall further proceed for not less than 120 0m from the place of obstruction from BG track (800m for MG track) and plant three detonators at 10m apart on rails. After this he shall display the red flag (red lamp during night) at a distance of 45m from the detonators.

Attempts shall also be taken to send an advice to nearest Railway station about the incident immediately.



(ii) Action to be taken if train is seen approaching to site of danger and there is no time to protect the track as per guidelines mentioned above?

In such a case the detonators shall be planted on rails immediately at distance away from place of danger as far as possible and attention of driver of approaching train shall be invited by whistling, waving the red flag vigorously, gesticulating and shouting.

(iii) What action shall be taken if more than one track is obstructed?

- a. In case of single line protection as above shall be done in both the directions from place of danger.
- b. In case of double line or multiple lines, if other tracks are also obstructed, the protection as above shall be done for other track also.
- c. The protection shall be done in that direction and on that track first on which train is likely to arrive first.
- d. The Contractor's Supervisors, Operators and lookout men shall be properly explained about the direction of trains on running tracks.

(iv) Equipment required for protection of track.

Minimum complement of protection equipment i.e. 10 detonators, 4 red hand flags, 4 red hand lamps, 4 banner flags and whistles etc. shall always be kept ready at worksites for use in case of emergency. Railway will arrange to provide detonators, whereas Contractor shall arrange other equipment at his own cost.

(v) Arrangement of lookout men and competency required for lookout man to warn labour about approaching train.

- a. Contractor will provide lookout men.
- b. The lookout men shall be properly trained in warning to staff at worksite about approaching train.
- c. Only those lookout men shall be provided at site who have been issued with a competency certificate by the Railway's Supervisor.
- d. In case, it is felt necessary to provide lookout men by Railway, the charges for the same as fixed by Railway Administration shall be recovered from Contractor.

Training to Supervisors and Operators of Contractor.

The Supervisors and Operators of the contractor proposed to be deployed at work site, which is close to the running track, shall be imparted mandatory training by the Railway at site free of cost about the safety measures to be adopted while working in the vicinity of running track. Engineer-in charge of the work shall decide the scale, extent & adequacy of training. In case training is imparted at a recognized Railway training institute, the charges for the same, as decided by Railway, shall be recovered from contractor. A competency certificate to this effect to the individual Supervisor/Operator shall be issued as given below, by a Railway Officer not below the rank of Assistant level. No Supervisor/Operator of the Contractor shall work or allowed to work in the vicinity of running track who is not possession of valid competency certificate.

All the labour, materials, tools, plants etc. except detonators, required for ensuring safe running of trains shall be provided by Contractor at his own cost. Wherever lookout men are provided by Railway, charges at the rate of Rs. 500/- per man day shall be recovered from Contractor.

Competency Certificate

Certified that Shri _____ Supervisor/Operator of M/s. _____ has been trained and examined in safety measures to be followed while working in the vicinity of running railway track for the work _____. His knowledge has been found satisfactory and he is capable of supervising the work safely. This certificate is valid only for the work mentioned in this certificate only.

Signature and designation of the officer

2. JOINT PROCEDURE ORDER FOR UNDERTAKING DIGGING WORK IN THE VICINITY OF UNDERGROUND SIGNALLING, ELECTRICAL & TELECOMMUNICATION CABLES

Following joint procedure shall be followed while carrying out any digging work near to existing signaling & telecommunication and electrical cables so that the instances of cable cut due to execution of works can be controlled and minimized.

Before taking up any digging activity on a particular work by any agency, concerned Sr. DSTE and Sr. DEE/.../Dy.CEE/... of the section shall be approached in writing by contractor for permitting to undertake the work. Sr. DSTE and Sr. DEE/.../Dy.CEE/..., after ensuring that the concerned executing agencies (contractor) have fully understood the S&T and Electrical cable route plan, shall permit the work in writing within 7 days of the request made for the same.

After getting the permission from S&T and/or Electrical department as the case may be, the relevant portion of the cable route plan shall be attached to the letter through which permission is issued to the contractor for commencement of work and ensuring that the contractor have fully understood the cable route plan and precautions to be taken to prevent damage to the underground cables. The contractor shall be asked to study the cable plan and follow it meticulously to ensure that the safety of the cable is not endangered.

On receiving the above information from contractor, SE/Sig. or SE/Tele or SE/ Electrical (Const., TRD or G) shall visit the site on or before the date of taking up the work and issue permission to the contractor to commence the work after checking that adequate precautions have been taken to avoid the damage to the cables. The permission shall be granted within 3 days of submission of such request.

The name of the contractor, his contact telephone number, the nature of the work shall be notified in the Electrical & S&T control as soon as the concerned S&T / Electrical officials issue the letter authorizing commencement of work to the contractor. Control / Test room shall be given copies. Control/Test room shall collect any further details from the Engineering control and shall pass it on to S&T/Railtel& Electrical officials regularly. In case the supervisors of concerned departments do not turn up on the days advised in terms of Para 39.3 above, the work of contractor shall not be stopped on this account.

In all the sections where major projects are to be taken up/going on, Electrical department shall deploy their officials to take preventive/corrective action at site of work. As regards other departments, the officials may be deputed on need basis.

The works of excavating the trench and laying of the cable should proceed in quick succession, leaving a minimum time between the two activities.

In case damage is caused to OFC/Quad cable/Electrical cable/Signaling cable during execution of the work, the contractor is liable to pay a penalty for damaging the cable. Penalty shall not be levied in case of the following:-

- (i) Detailed cable route plan is not provided by concerned department or cable is not protected as per laid down procedures.
- (ii) The alignment of the cable does not tally with the information provided to the contractor.
- (iii) The cable depth is found to be less than 800 mm from normal ground level.
- (iv) No representative of S&T/Electrical department was available at site guarding the cables on the fixed pre determined date and time.

Penalty to be imposed for damages to cable shall be as under:-

Cable damaged	Penalty per location
Only Quad cable or Signaling cable	Rs. 1.0 Lakh
Only OFC	Rs. 1.25 Lakh
Both OFC & Quad	Rs. 1.5 lakh
Electrical Cable	Rs. 1.0 Lakh

In case of damage to OFC, RailTel should be paid 5/6th of the penalty recovered. RailTel shall raise demands on the S&T department in this regard.

All types of Signaling & OHE bonds i.e. rail bond, cross bond and structure bond shall be restored by the contractor with a view to keep the rail voltage low to ensure safety of personnel.

S&T cable and Electrical cable route plan should be prepared by the concerned S&T and Electrical officers respectively and go to approved before undertaking the work. The completion cable route plan should be finalized block section by block section as soon as the work is completed.

2.12. All cable laying works shall be executed as per laid down technical specifications, such as protection measures/ protective cover, compaction of refilled material etc.

(Ref: JPO issued by Railway Board vide letter no. 2003/Tele/RCIL/1 pt. IX dated 24.06.2013 (Telecom circular no. 17/2013) for undertaking digging work in the vicinity of signaling, electrical and telecommunication cable will be followed during the execution of work)