

North Western Railway - Jodhpur Division - Electrical/G Department					
Schedule of Rate and Quantities					
<b>Name of work:- Electrical Work in c/w (i) provision of joint SNT Store near BGKT Diesel Shed (ii)provision of electronic interlocking at PLCJ station over Jodhpur Division.</b>					
S. N.	Description of Item	Unit	Qty	Rate	Amount (Rs)
1	Supply, erection, testing and commissioning of 16Mtrs high mast shaft totally hot dip galvanized and suitable for wind velocity as per IS 875 part-3 as per spec	Nos	2	138784.6	277569.20
2	Design and casting of suitable foundations with M-20concretes for the above 16mtr high mast having the safe soil bearing capacity at site as 10T/sq mtr at 2 meter depth including supply of foundation bolts manufactured from special steel along with nuts, washers and anchor plates and templates.	Nos	2	13794.6	27589.20
3	Supply & installation of control panel housing suitable timer contactor circuit for Automatic switch ON & switch OFF of the mast at a preset time.	Nos	2	16767.9	33535.80
4	Supply and fixing of aviation light luminaires of BGAV 302 LED of Bajaj or similar comprising of aluminium housing with polycarbonate enclosure (1 fitting per mast is necessary if no taller structures are in the vicinity). Fitting should be of reputed make and as per tech. spec.	Nos	4	3963.51	15854.04
5	Supply, fixing, testing and commissioning of Distribution Board double door, 3-phase and neutral with incoming 63A 4-pole MCB and outgoing 12Nos. MCB 6-32A single pole as per spec.	Nos	8	4820	38560.00
6	Installation/shifting testing and connection of ceiling fans along with associated items (Fans will be supplied by Railway). As per specification.	Nos	60	57.97	3478.20
7	Supply of material and wiring of shed TP/FP with 1.5 sq mm single core multi-stranded copper wire PVC insulated in conduit 1.5mm thick 19mm size white colour shall be fixed with junction box TEE and 1.5minsq PVC CU cable insulated multi stranded for earth wire and 5/6A,ceiling rose. The conduit shall be fixed with raw plugs/ tied with 14SWG copper wire including connection as per spec.	Nos	200	120.13	24026.00

8	Supply and fixing of PVC cable duct 40 x 60 (w x h) 1 M STD slot greenish gray of standard make as per specification	Mtrs	2000	104.38	208760.00
9	Supply, drawing, testing and commissioning of PVC copper wire 6 sqmm as per specification	Mtrs	2200	35.35	77770.00
10	Supply, fixing, testing and commissioning of fabricated Feeder Pillar distribution box made of MS sheet 1.6mmthick size 600x300x600mmwith suitable MS stand Copper bus bar of 200Acapacity and 2x63A MCB 4pole as per spec	Nos	12	5406	64872.00
11	Supply, installation ,testing & commissioning of MDB with three phase electronic Energy meter, digital ampere meter with CT, selector switch, suitable digital voltmeter and indication lamp with following incoming & outgoing Incoming- MCCB 4 pole 400A,35KA 2 Nos. Outgoing- MCCB 4 pole 250A,35KA-06Nos. as per spec	Nos	1	251730.77	251730.77
12	L.T. Panel-I Manufacturing, supplying, testing and commissioning of wall/floor mounted (as per site requirement) LT Distribution board with 01 No. 200 Amp. 4 pole 415 Volt, 50 Hz, thermal magnetic MCCB as incoming and 02 No.100 Amp. 4 pole MCCB, 03 Nos. 40/63 Amp. 4 pole MCCB as outgoing. .(As per Specification attached)	Nos	1	114228.00	114228.00
13	Supply & fixing of Exhaust Fan 300 mm sweep plastic body of make-Bajaj/USHA or similar	Nos	40	2167.35	86694.00
14	Supply of material & wiring of sub-main with 2x6 sq mm PVC insulated multi-strand ( 84 / .30 mm ) copper conductor cable in existing laid ( surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as per specifications attached as required.	Mtr	260	117.72	30607.20
15	Supply of material & wiring of sub-main with 2x4 sq mm PVC insulated multi-strand ( 56 / 0.3 mm ) cooper conductor cable in existing laid ( surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as per specifications attached as required.	Mtr	660	83.31	54984.60

16	Supply of material & wiring of sub-main with 2x2.5 sq mm PVC insulated (36 /0.3 mm) multi-strand copper conductor cable in existing laid (surface / recessed) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as per specifications attached as required	Mtr	1480	65.43	96836.40
17	Supply and Fixing of 20 mm dia medium class P.V.C. Pipe along with accessories as required in recess on walls/roof properly including cutting of wall /roof and making good the damages as per specifications attached.	Mtr	1050	76.18	79989.00
18	Supply and Fixing of 20 mm dia medium class PVC Pipe along with accessories as required in surface on walls/roof properly with saddles and wooden gutties etc. complete as per specifications attached.	Mtr	100	49.91	4991.00
19	Supply and providing pedestal fan 400mm sweep as per spec	Nos	10	1999.58	19995.80
20	Supply, install, test commission of 8Moduler metal flush box with suitable size cover &base frame as per specification	Nos	94	359	33746.00
21	Supply, install, test commission of 4Moduler metal flush box with suitable size cover &base frame as per specification	Nos	55	270.62	14884.10
22	Supply, install, test commission of 3Moduler metal flush box with suitable size cover &base frame as per specification	Nos	24	206	4944.00
23	Supply, install, test &commission of 2 Modular metal flush box with suitable size cover &base frame as per specification	Nos	24	170.89	4101.36
24	Supply, install, test &commission of Modular6amp, 5 Pin Socket as per specification.	Nos	80	126	10080.00
25	Supply, install, test commission of Modular6amp one way/SP Switch, ISI marked as per specification	Nos	140	66	9240.00
26	Supply, install, test commissioning of Modular 16 amp, 3/3(6Pin) Socket as per specification	Nos	72	202.71	14595.12
27	Supply, install, test commission of Modular16 amp one way/SP Switch , 2 Modular ,ISI marked including connection / wiring on lighting switch board as per specification	Nos	72	139	10008.00
28	Supply, install, test &commission of Modular blank plate as per specification	Nos	50	11.7	585.00

29	Supply, install, test & commission of Modular socket type Fan regulator (5step , 2 Modular)including connection/wiring on lighting switchboard as per specification	Nos	54	469.4	25347.60
30	Recessed conduit wiring system-Supply of material and wiring of LP/TP/FP/Exhaust fan/ Bell point with single core multistrend copper conductor size 1.5 Sq.mm in PVC conduit pipe with 5/6 Amp modular type switch/ceiling rose/batten holder etc. As per specification	Nos	320	391.6	125312.00
31	Supply of material & commissioning of PVC casing caping 25X12 mm with accessories for surface wiring as per specification.	Mtr	400	22.95	9180.00
32	supply of 3 Core 2.5 sq. mm PVC Copper Circular Sheathed Cable with Rigid Conductor as per spec	Mtr	1200	110	132000.00
33	Assembling, fixing, hanging and making connection of Surface pendent mounted box type tube light fitting/street light/highbay light or any other light or other fitting as per specification.	Nos	210	68.59	14403.90
34	Supply, fixing, testing and commissioning of TPN DB 8-way with provision of incoming MCCB of 125A,IP 43/IK09, double door at suitable locations.	Nos	6	14474.29	86845.74
35	Supply, Fixing of MCB to be provided in the MCBDB including supply of material as required & as per specifications attached-MCB (SP-) 6-32 A	Nos.	200	225.67	45134.00
36	Supply, Fixing of RCCB to be provided in the MCBDB including supply of material as required & as per specifications attached-RCCB - 25 A/30mA	Nos.	16	2379.24	38067.84
37	Supply, Fixing of MCB TPN to be provided in the MCBDB including supply of material as required & as per specifications attached-MCB(TPN)-63A	Nos	12	1974.02	23688.24
38	Supply, Fixing of MCCB to be provided in the TPN DB given above including supply of material as required & as per specifications attached- MCCB 4-pole 100/125A, 25 KA	Nos	4	13033.26	52133.04
39	Supply, install, test & commission of Ray roll plug socket 20amp SPN Ray Roll Plug socket including connection /wiring of "C" series 32 amps SP-MCB as per specification.	Nos	34	839.60	28546.40

40	Supply. fixing, testing and commissioning of SPN DB 8-way with provision of incoming MCB of 63A,IP 43/IK09, double door at suitable locations.	Nos	10	2405.69	24056.90
41	"B" Class 50 mm dia GI pipe earth Station with digging pit & refilling with charcoal & salt as per specification.	Nos	17	1300.64	22110.88
42	Inspection Chamber with cover as per specification	Nos	17	362.76	6166.92
43	Supply & laying of earth connection from earth electrode with 4 mm GI wire properly fixed on wall with wooden gutties etc. as required.	Nos	170	11.01	1871.70
44	Digging and filling of trench size 0.4 x 0.8 mtr as per spec (trench work may be on kuchcha/ pucca 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	9000	38.2	343800.00
45	laying cable in Air/Wall/Pole with fixture(02 nos. per mtrs) as per specification	Mtrs	400	22.83	9132.00
46	Laying, connecting & commissioning of cable in pipe/trench etc. with complete lug,glands & transportation of cable etc. as per specification	Mtrs	2000	234.15	468300.00
47	Supply and laying of HDPE pipe confirming to IS 4984:1995, 50 mm dia, wall thickness 3 mm, PN 6 under the road. The work involves laying of HDPE pipe.	Mtrs	9000	92.58	833220.00
48	Drilling of horizontal bore below track/road by pushing method for laying of RCC/HDPE/DWC pipe of various sizes (As per specifications)	Mtrs	700	1337.13	935991.00
49	Supply & laying of HDPE pipe, dia 160 mm under road/ground/floor/railway track or as per site requirement in already excavated trench. (As per specification)	Mtrs	700	741.75	519225.00
50	Supplying., laying of GI pipe size 50 mm dia. B class as per IS1239 for cable use as per specification enclosed	Mtrs	100	323.17	32317.00
51	Supplying., laying of GI pipe size 100 mm dia. B class as per IS1239 for cable use as per specification enclosed	Mtrs	10	633.7	6337.00
52	J' type cable route marker made of cast iron as per approved Railway drawing.	Nos	20	208.01	4160.20

53	Supply, installation, testing & commissioning of (300 mm width x 50 mm depth x 1.6 mm thickness) perforated Hot Dipped Galvanized Iron Cable Tray (Galvanization thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections fixed with MS Angle frame duly painted of 35 mm x 5 mm thick and all hardware complete in all respect.	mtr	200	944	188800.00
54	Supply, fixing, testing and connecting of wall mounted heavy duty Air Circulator of 24"(600mm) size with built in 3 speed regulator, delivers Air 280Cu.m/min, similar to M/s Almonard make with all accessories complete confirming to IS specification with latest amendments. The Air Circulator is to be fixed by suitable MS clamps of size 50x50x6mm / flats of size 40x6mm with bolts and nuts etc., complete as desired by site engineer.	Nos	20	9357.61	187152.20
55	Erection of 7 mtrs high single arm hot dip galvanized Steel Octagonal "Smart poles" with galvanized base plate of 220 x 220 x 12 mm Foundation PCD 205 & Bolt size (4x20 mm dia X 700 mm) length in position including excavation of pit and filling the same with concrete 50 cm ground level from base plate mounting including supply of material as required The pole shall be galvanized internally & externally by single dipping method .Make BAJAJ, GE, Crompton Greaves, Philips or similar.	Nos	20	11694.00	233880.00
56	Supply installation, testing and commissioning of 0.5 HP Mono block Pump as per specification	nos	6	5753.56	34521.36
57	Supply, Testing & Fixing of wall mounted cabin fan with regulator three speed, suitable for 220- 230 volt ,50HZ AC supply .Model No-Media BW 04 of Bajaj or similar to Usha/ Crompton Greaves /Philips .	Nos	35	1842.88	64500.80
58	Supply of Phenolic top sheet wooden board size 7" x 4" with one no. 5x15 amp switch socket combined & one nos. 5 amp switch ISI mark make-Anchor/Vinay/ABB/Cona/Legrand as per specification	Nos	20	135	2700.00

59	Supply of Phenolic top wooden board size 6"x15" fitted with 4 nos. switch & 4 nos. socket of 6 amps with internal wiring of 1.5 sq. mm with base plate of both side particle board for mobile with hanging clip as per specification	Nos	30	348	10440.00
60	Supply, install, test & commissioning of load change over switch in steel sheet enclosure 250 Amp. (as per specification)	Nos	1	11928	11928.00
61	Supply, Fixing, testing and commissioning of LED panel light of size 2'X2' similar to Philips Full Glow model No. RC 380B LED 34S-6500 L60W60 PSD OD S1 or similar	Nos	35	1180	41300.00
62	Supply, fixing, testing & connecting of LED backlit double sided signage boards within IP-65 CRCA housing, vinyl print on acrylic sheet which is backlit with high grade, high brightness LED modules, inbuilt SMPS driver, without battery backup, operating voltage 80v-270V AC, life period >50000 hrs, LPM technology, including fabrication and supply of clamping arrangements as desired by site engineer.	sqft	30	2546.52	76395.60
63	Supply, fixing and commissioning of 60 Amp. Capacity 240 volts, 50 Hz. for 10 KVA AT automatic Change Over Control and Distribution panels for CLS as per Latest RDSO Specification No. TI/SPC/ PSI/CLS/ 0020 with A & C Slip 1 to 4. CORE approved drawing no.: COS/CORE/ 2005/01 Rev.02 or latest	Nos	1	48442.14	48442.14
			<b>Total</b>		<b>6301662.25</b>

CTA/W/JU

ADEE/JU

Sr.DEE/G/JU

## **TEHNICAL SPECIFICATION**

**Name of Work :- Electrical Work in c/w (i) provision of Joint SNT Store near BGKT Diesel Shed (ii) Provision of electronic interlocking at PLCJ station over Jodhpur Division.**

All the work shall be carried out as per IE rules & regulation and also as per IS-732 Code of practice for Electrical Wiring Installation.

All electrical installations works shall conform to relevant Indian Standard Code of Practice and carried out as per relevant safety code of Practices, Guide for Safety Procedures in Electrical work as per IS 5216/Pt.I& II /1982 shall be observed.

### **1. SCOPE OF WORK INVOLVES**

1.1 Electrical Work in c/w (i) provision of Joint SNT Store near BGKT Diesel Shed (ii) Provision of electronic interlocking at PLCJ station over Jodhpur Division.

1.2 Any damage to building or railway property should be made good to the satisfaction of railway by contractor, else it will be recovered by contractor.

1.3 The list of standard and approved make of equipment and other items is enclosed in tender document. 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.

### **NOTE- INSPECTION OF MATERIAL-**

1. The major/high value items costing more than Rs 5 lakh shall be inspected by RITES or as decided by Sr.DEE/G/JU. Inspection shall be at manufacturer's premises to conduct the test, if necessary. Contractor shall provide all necessary assistance in carrying out test.

2. The inspection charges for RITES inspection shall be borne by railways.

3. For remaining items sealed samples should be submitted by contractor/supplier to site engineer. He will submit the samples with sample register and get it approved from ADEE/ DEE/Sr.DEE.

4. 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. Pre commissioning test if needed on various equipment may be carried out jointly by the contractor.

### **1. Standard Specification**

Wherever a reference to any IS specification appears in this tender paper, the same shall be taken as a reference to the latest version of the said specification.

### **2. Standard Makes -**

(i) All Items endorsed by BEE under star rated labelling scheme should be of 5 star or highest rating in that category as per BEE applicability.

(ii) Items not covered in above para should be ISI marked of reputed brand and as per technical specifications given in tender document reference list. The contractor has to supply & provide ancillary materials such as nut, bolt, clamps, brackets etc required for the work even if they are not mentioned in the tender schedule.

(iii) If any disputes arise during execution, then decision of SrDEE/JU/NWR will be final & binding upon contractor. Any contradiction in schedule of rate and specification; decision of Railway authority will be final & binding to contractor as per railway requirement.

(iv) The unit rate in the rate schedule includes supply, installation, testing, & commissioning including all contingent material if not specified in the rates schedule.



(v) Electrical works shall be carried out by the contractor in supervision of the railway Engineers and contractor shall inform the railway representative before starting the work. All the hidden work i.e. foundation work, laying of cables etc. shall be carried out in the presence of railway supervisor / representative.

(vi) Minor deviations in below mentioned specifications are allowed subject to suitability to Railway requirement and approval of ADEE/DEE/Sr.DEE.

Technical specification details NS wise is being given as below:-

NS No.	Description of Item																																																			
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2	galvanized and suitable for wind velocity as per IS 875 part-3.																																																			
3	<b>STRUCTURE:</b> The high mast shall be of continuously tapered, polygonal cross section, at																																																			
4	least 20 sided, presenting a good and pleasing appearance and shall be based on proven in-tension design confirming to be standards referred to above, to give an assured performance, and reliable service. The structure shall be suitable for wind loading as per IS-875, part-III 1987 or latest.																																																			
	<table><tr><th>Height of Mast</th><th>Unit</th><th>16 Mtr.</th></tr><tr><td>Material Construction</td><td></td><td>IS 2062 grade E350 / BS EN 10025 or Equivalent having minimum yield strength of 350 N/Sq. mm</td></tr><tr><td>No. of Longitude Welds</td><td>No.</td><td>Single</td></tr><tr><td>Top/ Bottom (diameter of High Mast)</td><td>mm.</td><td>150/410</td></tr><tr><td>Cross section of Mast polygon ( No. of Sides)</td><td>No.</td><td>20 Sides</td></tr><tr><td>Nos. of Section of Mast</td><td>No.</td><td>2</td></tr><tr><td>Thickness of Section</td><td>MM</td><td>3-4</td></tr><tr><td>Thickness of Galvanizations (Min.)</td><td>Micron</td><td>As per BSEN ISO 1461 (For Steel ≤ 3 mm - 55 Microns)</td></tr><tr><td>Size of Base Plate (Min.)</td><td>MM</td><td>570</td></tr><tr><td>Thickness of Base Plate (Min.)</td><td>MM</td><td>30</td></tr><tr><td>Foundation Bolts</td><td></td><td></td></tr><tr><td>Nos of Bolts</td><td>No.</td><td>8</td></tr><tr><td>PCD of Foundation</td><td>MM</td><td>490</td></tr><tr><td>Bolt Diameter/ Grade/ Tensile Strength</td><td>MM</td><td>30X850/ EN 8 Grade Minimum tensile strength 600 N/mm2</td></tr><tr><td>Lantern Carriage (No. of Half)</td><td>No.</td><td>2</td></tr><tr><td>Material of construction of LC/Lantern carriage finish</td><td></td><td>50 NB ERW Class A - M. S. Pipe</td></tr><tr><td>Lantern Carriage ( No of Arms)</td><td>No.</td><td>Min. 6</td></tr></table>	Height of Mast	Unit	16 Mtr.	Material Construction		IS 2062 grade E350 / BS EN 10025 or Equivalent having minimum yield strength of 350 N/Sq. mm	No. of Longitude Welds	No.	Single	Top/ Bottom (diameter of High Mast)	mm.	150/410	Cross section of Mast polygon ( No. of Sides)	No.	20 Sides	Nos. of Section of Mast	No.	2	Thickness of Section	MM	3-4	Thickness of Galvanizations (Min.)	Micron	As per BSEN ISO 1461 (For Steel ≤ 3 mm - 55 Microns)	Size of Base Plate (Min.)	MM	570	Thickness of Base Plate (Min.)	MM	30	Foundation Bolts			Nos of Bolts	No.	8	PCD of Foundation	MM	490	Bolt Diameter/ Grade/ Tensile Strength	MM	30X850/ EN 8 Grade Minimum tensile strength 600 N/mm2	Lantern Carriage (No. of Half)	No.	2	Material of construction of LC/Lantern carriage finish		50 NB ERW Class A - M. S. Pipe	Lantern Carriage ( No of Arms)	No.	Min. 6
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	<b>CONSTRUCTION:</b> The mast shall be fabricated from special steel plates, cut and folded to form a polygonal section as stated above and shall be telescopically jointed and welded. The procedural weld geometry and the workmanship shall be exhaustively tested on the completed welds. Mast shall be delivered to site in three sections only. Each section shall be fabricated out of individual plates duly folded and welded. There shall be only one longitudinal seam weld per section. Sections fabricated out of multiple plates or with more than one weld shall not be accepted. There shall not be any other internal or external welds in the mast sections. At site the sections shall be jointed together by slip-stressed-fit method. No site welding or bolted joint shall be done the mast. The minimum overlap distance shall be 1.5 times the diameter at penetration. The dimensions of the mast shall be decided based on proper design and design calculations shall be submitted for verification. The mast shall be provided with fully penetrated flange, which shall be free from any lamination or incursion. The welded connection of the base flange shall be fully developed to the strength of the entire section. The base																																																			

flange shall be provided with supplementary gussets between the bolt-holes to ensure elimination of helical stress concentration. For the environmental protection of the mast, the entire fabricated mast shall be hot dip galvanized, internally and externally, having a uniform thickness. The mast sections shall be galvanized by single dipping method. Sections galvanized by double/multiple dipping methods shall not be accepted.

**DOOR OPENING:** An adequate door opening shall be provided at the base of the mast and the opening shall be such that it permits clear access to equipments like winches, cables, plugs and sockets etc and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof door, provided with a heavy-duty double internal lock with special paddle key. The door opening shall be carefully designed and reinforced with welded steel section, so that the mast section at the base shall be unaffected and undue bucking of the cut portion is prevented. Size of door opening shall not be more than 1100x280mm to avoid bucking of the mast section under heavy wind condition.

**DYNAMIC LOADING FOR THE MAST:** The mast structure shall be suitable to sustain an assumed maximum reaction arising from a wind speed (three second gust), and shall be measured at a height of 10 meters above ground level. The design life of the mast shall be a minimum of 25years.

**LANTERN CARRIAGE: FABRICATION:** A fabricated lantern carriage shall be provided for fixing and holding the LED Light fittings and control gearboxes. The lantern carriage shall be of special design and shall be of steel tube construction, the tubes acting as conduits for wires, with holes fully protected by grommets. The lantern carriage shall be so designed and fabricated to hold the required number of LED Light fittings and the control gearboxes and also have a perfect self-balance. The lantern carriage shall be fabricated in two halves and joined by bolted flanges with stainless steel bolts and nylon type stainless steel nuts to enable easy installation or removal from the erected mast. The inner lining of the carriage shall be providing with protective PVC arrangement, so that no damage is caused to the surface of the mast during the raising and lowering operation of the carriage. The entire lantern carriage shall be hot dip galvanized after fabrication.

**JUNCTION BOX:** Weather proof junction box, made of cast Aluminum shall be provided on the carriage assembly as required, from which the interconnections to the designed number of the LED light luminaries and associated control gears fixed on the carriage shall be made.

**RAISING AND LOWERING MECHANISM:** For the installation and maintenance of the luminaries and lamps, it will be necessary to lower and raise the lantern carriage assembly. To enable this, a suitable winch arrangement shall be provided, with the winch fixed at the base of the mast and the specially designed head frame assembly at the top.

**WINCH:** The winch shall be of completely self-sustaining type, without the need for brake Shoe, springs or clutches. Each driving spindle of the winch shall be positively locked when not in use, by gravity activated pawls. Individual drum also should be operated for fine adjustment of lantern carriage. The capacity, operating speed, safe working load, recommended lubrication and serial number of the winch shall be clearly marked on each winch. The gear ratio of the winch shall be 53:1. However the minimum-working load shall be not less than 750kg. The winch shall be self- lubricating type by means of an oil bath and the oil shall be readily available grades of reputed producers. The winch drums shall be grooved to ensure perfect seat for stable and tidy rope lay, with no chances of rope slippage. The rope termination in the winch shall be such that distortion or twisting is eliminated and at least 5 to 6 turns of rope remains on the drum even when the lantern carriage is fully lowered and rested on the rest pads. It should be possible to operate the winch manually by a suitable handle and/or by an integral power tool. Operation of the winch with manual handle shall be independent of the power tool. Winches with manually operation through the power tools shaft shall not be accepted. Individual drum operation of the winch shall be possible. A Double drum winch shall have 2 drums and two worm gears independent in operation for increased safety. It shall be possible to remove the double drum after dismantling, through the door opening provided at the base of the mast. Also, a winch gearbox for simultaneous and reversible operation of the double drum winch shall be provided as part of the contract. The winch shall be type tested in presence of a reputed institution and the test certificates shall be

furnished before supply of materials. A test certificates shall be furnished by the contractor from the original equipment manufacturer, for each winch in support of the maximum load operated by the winch.

**HEAD FRAME:** The head frame which is to be designed as a capping unit of the mast, shall be of welded steel construction, galvanized both internally and externally after assembly. The top pulley shall be of appropriate diameter, large enough to accommodate the stainless steel wire ropes and the multi-core electrical cable. The pulley block shall be made of non-corrodible material, and shall be of die-cast Aluminium Alloy (LM-6). Pulley made of synthetic materials such as plastic or PVC is not acceptable. Self-lubricating bearings and stainless steel shaft shall be provided to facilitate smooth and maintenance free operation for a long period. The pulley assembly shall be fully protected by a canopy galvanized internally and externally. Close fitting guides and sleeves shall be provided to ensure that the ropes and cables do not dislodged from their respective positions in the grooves. The head frame shall be provided with guides and stops with PVC buffer for docking the lantern carriage.

**STAINLESS STEEL WIRE ROPES:** The suspension system shall essentially be without any intermediate joint and shall consist of only no corrodible stainless steel of AISI 316/IS 1608 or better grade. The stainless steel wire ropes shall be of 7/19 construction, the central core being of the same material. The overall diameter of the rope shall not be less than 6mm. the breaking load of each rope shall not be less than 2350kg giving a factor of safety of over 5 for the system at full load. The end constructions of rope to the winch drum shall be fitted with talurit. The thistles shall be secured on ropes by compression splices. Three continuous lengths of stainless steel wire ropes shall be used in the system and no intermediate joints are acceptable in view of the required safety. No intermediate joints/terminations, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.

**ELECTRICAL SYSTEM, CABLE AND CABLE CONNECTIONS:** A suitable terminal box shall be provided as part of the contact at the base compartment of the high mast for terminating the incoming cable. The electrical connections from the bottom to the top shall be made by special trailing cable. The cable shall be suitable to get flexibility and endurance. Size of the cable shall be minimum 5 cores 2.5sqmm copper. The cable shall be of reputed make. At the top there shall be weatherproof junction box to terminate the trailing cable. Connections from the top junction box to the individual luminaries shall be made by using 3 core 1.5sqmm flexible PVC cables of reputed make. The system shall have in-built facilities for testing the luminaries while in lowered position. Also, suitable provision shall be made at the base compartment of the mast to facilitate the operation of internally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by mans of specially designed, metal clad multi-pin plug and socket provided in the base compartment to enable easy disconnection when required.

**POWER TOOL FOR THE WINCH:** A suitable high powered, electrically driven, internally mounted power tool, with manual over ride shall be supplied for the raising and lowering of the lantern carriage for maintenance purposes. The speed for the power tool shall be to suit the system. The power tool shall be single speed. Provided with motor of the required rating. The power tool shall be supplied complete with a suitable control switch so that the operation of the mast can be done at a safe distance. The capacity and speed of the electric motor used in the power tool shall be suitable for the lifting of the design load installed on the lantern carriage. The power tool mounting shall be so designed that it will be not only self-supporting but also aligns the power tool perfectly with respect to the winch spindle during the operations. Also, a handle for the manual operation of the winches in case of problems with the electrically operated tool, shall be provided and shall incorporate a torque limiting device. There shall be a separate torque-limiting device to protect the wire ropes from over stretching. It shall be mechanical with suitable load adjusting device. The torque limiter shall trip the load when it exceeds the adjusted limits. There shall be suitable provision for warning the operator once the load is tripped off. The torque limiter is a requirement as per the relevant standards in view of the overall safety of the system. Each mast shall have its own power tool motor.

**LIGHTING FINIAL:** One number heavy duty dip galvanized lighting finial shall be

	<p>provided for each mast. The lighting finial shall be minimum 1.2M in length and shall be provided at the centre of the head frame. It shall be bolted solidly to the head frame to get a direct conducting path to the earth through the mast. The lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.</p> <p><b>EARTHING TERMINALS:</b> Suitable earth terminal using 12mm diameter stainless steel bolts shall be provided at a convenient location on the base of the mast for lightning and electrical earthing of the mast.</p> <p><b>INCOMING POWER CABLE:</b> Suitable copper conductor armoured cable for motor supply shall be provided from feeder pillar to the base compartment of the high mast. Cable shall be taken to the base compartment of the high mast through the provision made in the foundation. Power cable of suitable size up to the feeder pillar from supply point shall be provided by the contractor. All copper cables required are included in the cost of the tender.</p> <p><b>LUMINARIES:</b> Luminaries shall be specially designed with suitable lamp housing and control gears for LED luminaries. The luminaries shall be tested as per Indian standards and test reports shall be submitted along with the materials. The luminaries shall be suitable for installation on high masts.</p> <p><b>FOUNDATION:-</b> Design and casting of suitable foundation with M-15/20 (as per manufacturers drg.) concrete for the 25 meter/16 meter (as per the item of schedule) high mast having the safe soil bearing capacity at site as 10T/sqmtr at 2 meter depth including supply of foundation bolts manufactured from special steel along with nuts, washers and anchor plates and templates suitable for high mast, of the manufacturer. It shall according to manufactures drawing and nuts &amp; bolts of foundation shall also as per OEM manufacturers drawing for 16 mtrs HM tower separated.</p> <p><b>Aviation light:</b> Luminaries of BGAV 302 LED of Bajaj or similar comprising of aluminium housing with polycarbonate enclosure. (Min 01 fitting per mast is necessary if no taller structures are in the vicinity).</p> <p>Supply &amp; installation of control panel housing suitable timer contactor circuit for Automatic switch ON &amp; switch OFF of the mast at a preset time as per site requirement.</p> <p>Each mast shall be provided with a feeder pillar fabricated out of 14 SWG CRCA sheet and finished with two coats of red oxide primer and gray enamels paint of shade 631 of IS -5. The feeder pillar shall comprise of incoming 32 Amp. TPN switch, HRC Fuses, Copper wiring, outgoing 32 Amp SP, TP MCB for power tool contractor for reversing the motor and timer. Feeder pillar shall be mounted on suitable foundation near to mast as per site requirement.</p>
5	Supply, fixing, testing and commissioning of Distribution Board double door, 3-phase and neutral with incoming 63A 4-pole MCB and outgoing 12Nos. MCB 6-32A single pole as per site requirement. Drawing & TDS should be approved before supply.
6	Installation/shifting testing and connection of ceiling fans as per site requirement (Fans will be supplied by Railway). This includes installation of new ceiling fan with connection and removal of existing ceiling if any & to be installed at other locations as per direction of site engineer.
7	Supply of material and wiring of PF shelter's Tube light points/fan points and other misc points etc in shelters with 1.5 sq mm single core multi-stranded copper wire PVC insulated in conduit 1.5mm thick 19mm size white colour shall be fixed with junction box TEE and 1.5 min sq PVC CU cable insulated multi stranded for earth wire and 5/6A, ceiling rose. The conduit shall be fixed with raw plugs/ tied with 14SWG copper wire including connection as per spec.
8	The contractor shall have to supply and fixing of PVC cable duct 40 x 60 (W x H) 1M STD slot greenish gray in shed shall be properly clamped on structure with the help of MS flat 35 x 5 mm & suitable size GI nut-bolt-washer in well-dressed manner as per satisfaction of site engineer.
9	Supply, drawing, testing and commissioning of PVC copper wire 6 sqmm flame retardant, low smoke single core insulated unsheathed multi-stranded copper conductor, voltage grade 1100V confirm to IS694- 1990 or latest as per site requirement.
10	Supply, fixing, testing and commissioning of fabricated Feeder Pillar distribution box

	made of MS sheet 1.6mm thick size 600x300x600mm with suitable MS stand Copper bus bar of 200A capacity and 2x63A MCB 4 pole as per site requirement.
11	<p><b>400A LT Panel-</b></p> <ol style="list-style-type: none"> <li>The contractor shall have to design, supply, install, testing &amp; commissioning the Main distribution board. The main distribution board shall be fabricated out of 2mm thick MS sheet and standard angle/channels as required in design.</li> <li>The main distribution board shall be pillar type, cubical type self-supporting floor mounted dust &amp; vermin proof. The board should be with hinged doors &amp; locking arrangements at the front &amp; bolted for hinged cover at either side/back side. It should also be provided with bottom opening of removable gland plates. The board should be suitable for 3 phases, 4 wires, 415 volt 50 cycle AC supplies. The board shall be treated with rust protection such as degreasing, prospecting &amp; painted with two coats of red oxide primer &amp; final two coats of leaf green paint.</li> <li>The bus bar shall be electrolytic tinned copper having cross section area as main bus bar of MDB 300mm<sup>2</sup> &amp; branch bus bar 200mm<sup>2</sup> respectively. The bus bar shall have to be suitably mounted with PVC sleeve/taps.</li> <li>The contractor shall have to submit the design &amp; dimensional drawing of the distribution board for approval before fabrication.</li> <li>Adequate space inside the board shall be provided for bus bar, the cable alley shall be provided to accommodate the incoming &amp; outgoing cables separately in a proper manner. Knock out gland plates as applicable shall be provided in the distribution board for incoming &amp; outgoing cable.</li> <li>Circuit identification &amp; cable size by means of engraved on poly prop lane sheet as approved by Rly shall be provided.</li> <li>All power connection shall be secured adequately with spring washer, flat washer, bimetallic washer wherever applicable, G.I. bolts, tinned brass washer. Caution board &amp; danger notice in English &amp; Hindi shall be provided &amp; shall be of metallic type approved by Rly.</li> <li>Minimum two earth terminal shall be provided &amp; a separate earth GI earth strip at the back side of distribution board minimum of 25x6mm shall be provided with two earthing terminals.</li> <li>The contractor shall arrange factory inspection. The contractor shall have to submit manufacturer test certificate of all the component used in the fabrication of the board and also submit the calibration test report of all the meters used in the board.</li> <li>Main distribution board shall be provided with incoming &amp; out going as under: <ol style="list-style-type: none"> <li>Incoming side- MCCB 4 pole 400 Amp. 35 kA = 02Nos. (with adjustable T&amp;M setting)</li> <li>Outgoing side-. MCCB 4 pole 250 Amp. 35 kA = 06Nos. (with adjustable T &amp; M setting)</li> </ol> </li> <li>The distribution board shall be provided with suitable 3 phase Electronic energy meter with CT, Voltmeter size (96x96mm) 0-500 Volt, LED type indication lamp for OFF&amp; ON &amp; trip on incoming side and Ampere meter (size 96x96mm) 0-300 Amp. With CTs on outgoing side.</li> <li>The distribution board shall be completed in all respect with wiring. The board shall be mounted above 1.1/2 to 2' (feet) above the ground level with cement concrete base with proper grouting.</li> <li>The distribution board shall be provided with standard cable entry for incoming &amp; outgoing cables &amp; suitable hole shall be drilled at site for accommodating the incoming &amp; outgoing cables. The bus bar shall be covered with PVC adhesive colored tape. The drawings of the panel are to be got approved from ADEE/DEE/ SrDEE/JU before fabrication. The make of switchgears, metering, measuring and indicating instruments shall be from the approved makes. The make and the particular model numbers shall be particularly mentioned in the drawings being furnished for approval. The techno modular enclosure shall be procured from the firm/manufacturer bearing CPRI test certificate. <ol style="list-style-type: none"> <li>The enclosure shall bear techno modular construction, fully compartmentalized (if required), bolted construction (in order to enhance further on requirement).</li> <li>The main frame of the enclosure shall be built from 2mm CRCA and the doors and</li> </ol> </li> </ol>

	<p>covers from 1.6 mm CRCA. The mounting plates shall be of 2mm thickness. Cable entry plates of 3mm. Lifting angles 75 x 75 x 6 mm.</p> <p>1.3 The enclosure shall be dust proof and vermin proof with IP protection for outdoor installation. Use of PU foam gasket shall be made to ensure proper IP protection.</p> <p>1.4 Temperature withstand capacity shall be as per relevant standards. Test Certificate from authorized agency may be asked to produce during factory inspection. The enclosure shall be resistant to mild acids and solvents.</p> <p>1.5 The enclosure shall be powder coated with epoxy based paint of 500 hours certified. The colour shall be of Grey structure finish for enclosure. The powder coating thickness shall be 65 to 80 microns.</p> <p>1.6 The enclosure shall comprise top cover, front door and rear door. Proper cuttings /openings shall be provided in order to operate the switchgears without opening any door. The metering and measuring instruments shall be provided in front properly flushed with the surface.</p> <p>1.7 The size of the enclosure shall be sufficient enough to incorporate all the components with proper clearance as per IER and latest standards keeping in view the safety aspect.</p>
12	<p>LT. Panel-I Manufacturing, supplying, testing and commissioning of wall/floor mounted (as per site requirement) LT Distribution board 2 mm CRCA sheet steel fabricated, cubicle outdoor type IP protection, painted by one coat of red oxide primer and with two coats of synthetic enamel grey paint complete with top/bottom removable double compression cable gland plate as required, earth bus, hinged and lockable doors, dust and vermin proof, complete with all interconnections. Necessary wiring of LT panel shall be done with copper cable of adequate size &amp; control wiring by min. of 2.5 Sq.mm copper cable. The electrolytic Tinned copper bus bar shall be of suitable length 415 V, 3 phase 50 Hz, 200 A, suitable for four pole system as per relevant IS (latest version) insulated by heat shrinkable sleeves with shrouded joints.</p> <p>The instrument chamber shall be separate and comprise of flush type ammeter, voltmeter, selector switches, with CTs, feeder name plate and danger board on (approximate size of panel 1250mm x 950mm x 300 mm and electrolytic tinned copper bus bar of 25mm x 10mm for incoming MCCB and bus coupler and 20mm x 6mm for outgoing MCCB, earth bus of suitable size of electrolytic tinned copper) INCOMING: MCCB – 01 No. – 200 amps, 4Pole, 36kA, Icu=Ics=100% Thermal Magnetic setting, Conforms to IEC 60947-1 or latest and Similar to Cat No. CM92109OON1OG of L &amp; T. OUTGOING: MCCB – 02 Nos. - 100amps, 4Pole, 36 kA, TM setting, Icu=Ics=100% Similar to Cat No – CM92108OOL1OG of L&amp;T. MCCB – 03 Nos. – 63/40 amps, 4Pole, 25 kA, Thermal setting &amp; Magnetic setting Ics=100% Icu Similar to Cat No – SL98615O000 of L&amp;T.</p> <p>1 no. of 0-500 V, 96 x 96 mm square dial flush mounted voltmeter (digital) with selector. Switches protective fuses in incoming. 1 no. 96 x96 mm square dial flush mounted ammeter(digital) of suitable range with selector switches, CTs &amp; protective fuses, multi LED indication lamps on each incoming and outgoing feeder and 3 phase panel energy meter type CT-2M shall be provided with each outgoing feeder. This includes the shifting/termination/connection of existing supply from existing point to new point with complete lugs and glands etc.</p> <p>(a) Caution board in English/Hindi shall be provided of metallic type.</p> <p>(b) The contractor shall have to submit the design and dimensional drawing of the Distribution board for approval before fabrication.</p> <p>(c). The contractor shall arrange inspection/testing of the board when it is completed in all respected.</p> <p>(d). Foundation of panel and trenching work is included upto the satisfaction of site supervisor.</p> <p>(e) Circuit identification by means of engraved on poly propylene sheet as per design Approved by railway shall be provided. Note: - LT panel manufacturer shall have test reports of CPRI or any NABL certified LAB.</p>
13	Supply & fixing of Exhaust Fan having sweep of 250-300mm range, plastic body of make-Bajaj/USHA or similar
14	Supply of material & wiring of sub-main with 2x6 sq mm PVC insulated multi-strand copper conductor cable in existing laid (surface / recessed) PVC conduit pipe and continuous

	running of PVC insulated copper earth wire of 1 Sq.mm as per direction of site engineer.
15	Supply of material & wiring of sub-main with 2x4 sqmm PVC insulated multi-strand copper conductor cable in existing laid (surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm as per direction of site engineer.
16	Supply of material & wiring of sub-main with 2x2.5 sq mm PVC insulated multi-strand copper conductor cable in existing laid (surface / recessed) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as per site requirement.
17	Supply and Fixing of 20 mm dia medium class PVC Pipe along with accessories as required in recess / surface on walls/roof properly including cutting of wall /roof and making good. PVC pipe shall be confirming to IS 9537 (part-III) 1987 or latest. The PVC conduit shall have minimum wall thickness of 1.5mm and shall have ISI marking. Saddles for fixing conduit shall be heavy gauge non-metallic type with base. Higher size of PVC conduit shall be used wherever required for accommodating more number of wires.as per railway requirement. The colour of the PVC conduit shall be cream/white colour or other colour as approved by the Engineer.
18	Supply and Fixing of 20 mm dia medium class PVC Pipe along with accessories as required in surface. The surface PVC conduit shall be fixed with raw plugs saddles at equal distance of 50cm/60cm and should have necessary junction boxes, elbows as per requirement. Saddles shall be fixed at a closer distance on either sides of couplers or bends or similar fittings. After completion of Electrical work the contractor will undertake the damaged surface to repatch the wall plaster and fill up the recesses etc. in the wall occurred during wiring and rewiring/fitting of the same.
19	Supply and providing pedestal fan 400mm sweep in plastic body of make-USHA/CG/Havells or similar.
20	Supply, install, test & commission of 8Moduler metal flush box with suitable size cover &base frame complete in all respect as per site requirement.
21	Supply, install, test & commission of 4Moduler metal flush box with suitable size cover &base frame complete in all respect as per site requirement.
22	Supply, install, test & commission of 3Moduler metal flush box with suitable size cover &base frame complete in all respect as per site requirement.
23	Supply, install, test &commission of 2 Modular metal flush box with suitable size cover &base frame complete in all respect as per site requirement.
24	<p>The contractor shall have to supply, install, test &amp; commission of Modular type Socket–06amps, 3 Pin or (5-Pin), 240V, AC, Universal (two pins &amp; earth).</p> <p>The contractor shall have to supply, install, test &amp; commission of Modular type Socket–16amps, 3/3 Pin or (6-Pin), 240V, AC, Universal (two pins &amp; earth).</p> <p>The contractor shall have to supply, install, test &amp; commission of Modular Switch – 6amps, One way/SP, 240V AC, ISI marked.</p> <p>The contractor shall have to supply, install, test &amp; commission of Modular Switch –16amps, One way/SP, 2 modular, 240V AC, ISI marked.</p> <p>The above is including connection/wiring on lighting switchboard as per site requirement and direction of site engineer.</p>
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28	The contractor shall have to supply, install, test & commission of Modular blank plate made of polycarbonate FR Grade & UV stabilized, ISI marked.
29	The contractor shall have to supply, install, test & commission Modular socket type Fan regulator (5step, 2 Modular) including connection/wiring on lighting switchboard as per site requirement and direction of site engineer.
30	<p>Recessed conduit wiring system-Supply of material and wiring of LP/TP/FP/Exhaust fan/ Bellpoint etc points with single core multi strand copper conductor size 1.5 Sq.mm in PVC conduit pipe with 5/6 Amp modular type switch/ceiling rose/batten holder etc.</p> <p>Point/ sub main wiring shall be done in concealed in PVC Conduit pipe ISI Marked 1.5 mm thick, minimum 20 mm bend / junction, PVC insulated wire of size 1.5 sq mm 1100 V grade ISI marked confirming to relevant IS specifications and make as per reference list attached in tender shall be used for point wiring, and wires of 2.5/4/6 sq mm shall be used in sub – main as per item of schedule and instructions of site engineer. All metallic parts, fittings etc. shall be connected to the earth wire. Joints in Wires are not allowed. Sub-main shall be run in separate Conduit pipe, the wire of sub-main and the</p>

	loop of sub main belonging to same circuit may be taken through the pipe from the same sub-main. Switches: All 5 Amp Switches shall be provided on phase wire. The entire M.S. box shall have 3 mm thick hylam sheet with required groove cutting for fixing of switches / sockets etc. The wiring shall be done in such fashion that minimum conduit pipes run inside the room as far as possible. All type switches, 5 and 15 amp Sockets etc shall be modular type, ceiling rose, batten holder etc as per site requirement. The contactor shall dismantle old wiring completely in case it is replaced with new wiring. Samples of all wiring items shall be got approved from site engineer before installation. The copper wire used for earthing purpose shall not be less than wire used for wiring and sub mains respectively.
31	The contractor shall have to supply, install & commission of ISI marked, PVC casing & capping size 25mm x12mm (WXH) with accessories confirming to IS:14927 Part-2 or latest. The color of the PVC casing capping shall be cream/white color or other color as approved by the Engineer. The PVC casing capping shall be fixed with rawl plugs at equal distance of 50cm/60cm (approximate) and should have necessary junction boxes, elbows as per requirement. The fixing of the casing capping at a closer distance on either sides of couplers or bends or similar fittings as per site requirement and direction of site engineer.
32	Supply of 3 Core 2.5 sq. mm PVC Copper Circular Sheathed Cable with Rigid Conductor ISI mark 1100 V grade as per IS 694 or latest.
33	The contractor shall have to fix surface pendent mounted box type LED tube light fitting/street light /flood light fitting, batten lights or any other type light fittings as per requirement. The fitting shall be connected with the ceiling rose with PVC insulated flexible pvc pipe cord having multi strand copper conductor size 48/0.2mm (three core) or as per site requirement. Any damage to building or railway property should be made good to the satisfaction of railway by contractor else it will be recovered from contractor.
34	Supply, fixing, testing and commissioning of TPN DB 8-way with provision of incoming MCCB of 125A,IP 43/IK09, double door at suitable locations as per site requirement.
35	The contractor shall have to supply, Fixing of MCB (SP-) 6-32 A to be provided in the MCB DB including supply of material as required as per direction of site engineer. 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.
36	Supply, Fixing of RCCB to be provided in the MCB DB -RCCB - 25 A/30mA as per site requirement.
37	Supply, Fixing of MCB TPN to be provided in the MCBDB including supply of material as required –MCB (TPN)-63A as per site requirement.
38	Supply, installation, testing & commissioning of 4-POLE MCCBs THERMO-MAGNETIC BASED: - 125Amps. MCCB rating should be confirming to IEC 60947-2. MCCB shall be capable of clearing faults up to $I_{cs} = 100\%I_{cu}$ This is to be installed in VTPN type metal double door type 8 way DB/LT panels /DB etc for outdoor purpose and complete in all respect as per direction of site engineer.
39	Supply, install, test & commission of Ray roll plug socket 20amp SPN Ray Roll Plug socket including connection /wiring of "C" series 32 amps SP-MCB as per site requirement.
40	Supply. fixing, testing and commissioning of SPN DB 8-way with provision of incoming MCB of 63A,IP 43/IK09, double door at suitable locations at per site requirement.
41	<b>General</b> - Governing Specification – IS: 3043 <b>Earth Pipe:</b> 50-mm dia, "B" class, Medium, ISI marked, Approximate single piece of 03 meter length, Galvanized coating, relevant IS, perforated holes of 12mm dia. <b>Protection Pipe for GI wire:</b> 12mm dia, "A" class, Light, ISI marked, Galvanized coating, relevant IS. <b>Nuts &amp; Bolts:</b> with Galvanized coating. <b>Inspection Chamber:</b> Square earth station C.C. Block, C.C. Ratio: 1:4:8, chamber with RCC cover & handle as per drg.
42	
43	



ROCKY AREA OR COVER WITH HANDLE.

GROUND LEVEL

500mm MIN.

12mm G.I. PIPE

UP TO INSTALLATION

APPROX 300mm OF EXTRA LENGTH OF WIRE LOOPED IN NOT MORE THAN ONE TURN. (WIRE SIZE 8 SWG-GI)

50mm DIA. G.I. PIPE MEDIUM GRADE IS:1239

20 NOS. OF PERFORATED HOLES OF 12mm DIA.

CHARCOLE LAYER

ALTERNATE LAYER OF CHARCOLE & SALT

3000mm

2500MM

350mm

100

DETAILS AT 'y'

PUNCHED WASHER MG. IS. 2018 STEEL FOR HEX. BOLT

HEX. BOLT. M6 X 50N TO IS. 1366

NOTE-

1. AT PLACES WIRE MORE THAN ONE INDEPENDENT EARTH ARE TO BE PROVIDED IN NEAR VICINITY. THE SPACING BETWEEN ANY TWO EARTH SHOULD NOT BE LESS THAN 2.5 METRES
2. EARTHING SHALL BE DONE AS PER IS-3043
3. ALL DIMENSIONS ARE IN MILLIMETRE.
4. EARTH WIRE FROM EARTH PIT TO INSTALLATION SHALL BE RUN IN 12mm Ø G.I. PIPE IN THE GROUND AND 1500mm ABOVE GROUND LEVEL ON WALL/POLE WITH PROPER CLAMPS.
5. FOR ROCKY AREA REFER DRG. NO. DRM/ELECT./10029/3

WESTERN RAILWAY		
DETAILS OF PIPE EARTHING		
NOT TO SCALE		
MOD. 1	10-12-98	NOTE NO. 4 ADDED FOR R.C.C. PIPE PIT.
DRG. NO.		
NO. DRM (ELECT.) 10029/1/1		

Digging and filling of trench size 0.4 x 0.8 mtr as per spec ( trench work may be on kuchcha/ pucca 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.

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 mtr 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. Where more than one cable is to be laid in same trench Horizontal formation of the cables laying should be such that inter axia distance between the cables must be 20 cm at least and brick is to be laid. No extra payment will be paid for laying more than one cable in one trench.															
45	The cable shall be laid in Air/Wall/Pole/pipe with suitable fixture as per direction of site engineer.															
46	<p>Laying, connecting &amp; commissioning of cable in pipe/trench etc. with complete lug, glands &amp; transportation - Installation of cable underground include excavation of a trench of 40 to 45 cms in width and minimum 0.8m depth shall be made and while laying the cable a layer of sand 8cms Thickness should be placed at the bottom of trench and then the cable should be laid over it. After laying the cable a layer of 17 cm thick sand should be placed above the cable and then for mechanical protection good quality of brick/RCC cover should be placed on both sides and top i.e. 18 bricks per meter, After doing this, trench can be filled up with solid/sand available there by. Brick partition also shall be provided under the trench between the two cables.</p> <p><b>Depth-</b> The desired minimum depth of laying from ground surface to the top of cable is as follows:-</p> <p><b>Minimum Depth</b></p> <table><tr><td>High Voltage cables, 3.3 KV to 11 KV rating</td><td>:</td><td>1 m</td></tr><tr><td>High voltage cables, 22 KV, 33 KV rating</td><td>:</td><td>1.05 m</td></tr><tr><td>Low voltage and control cables</td><td>:</td><td>0.8 m</td></tr><tr><td>Cables at road crossings</td><td>:</td><td>1.00 m</td></tr><tr><td>Cables at railway level crossings (measured From bottom of sleepers to the top of pipe)</td><td>:</td><td>1.00 m</td></tr></table> <p>The duct/pipe joints should be covered by collars to prevent settlement of in between pipes. It may be desirable to leave a pilot wire inside the duct.</p> <p>The diameter of the cable conduit or pipe or duct should be at least 1.5 times the outer diameter of the cable. The ducts/ pipes should be mechanically strong to withstand forces due to heavy traffic when they are laid across road/railway tracks.</p> <p>Cables below Railway crossing- When the cables are laid under railway tracks the cables should be laid in reinforced spun concrete or cast iron or steel pipes at such depths as specified in the track crossing regulations-1987 but not less than 1 m measured from the bottom of sleepers to the top of the pipe. In the case of single-core cables the cast iron or steel pipes should be large enough to contain all the three single core cables forming the circuit in the same pipe.</p> <p>When the cables are laid under the tracks, the same shall be laid as per the track crossing regulation 1987.</p> <p>All cables should be properly terminated with standard size of lugs.</p> <p>Before and after laying the cable the I.R. value should be checked, all the instruments for testing shall be arranged by the contractor.</p> <p>Armouring of cable should be earthed at both the ends.</p> <p>Wherever the cables emerge out of ground at least one loop of sufficient radius should be provided under the ground.</p> <p>While laying the cable it should be ensured that no obstruction should come in way like drainage power cables, telecommunications cables, etc. The water logging area should be avoided. Wherever the cable routs changes or takes a turn a cable marker of approved design should be provided.</p> <p>The cable other than overhead track crossing be along the wall/pole above the ground level and floor level should be protected by G.I. pipe up to a height of 1.5 mtrs of suitable dia to prevent the cable from external damage.</p> <p>After completing laying of cable as per above instructions remaining refilling of the trench with soil as above proper ramming and surfacing similar to surrounding should be done by contractor to the satisfaction of railway site engineer.</p>	High Voltage cables, 3.3 KV to 11 KV rating	:	1 m	High voltage cables, 22 KV, 33 KV rating	:	1.05 m	Low voltage and control cables	:	0.8 m	Cables at road crossings	:	1.00 m	Cables at railway level crossings (measured From bottom of sleepers to the top of pipe)	:	1.00 m
High Voltage cables, 3.3 KV to 11 KV rating	:	1 m														
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Cables at railway level crossings (measured From bottom of sleepers to the top of pipe)	:	1.00 m														
47	Supply and laying of HDPE pipe conforming to IS 4984:1995, 50 mm dia, wall thickness 3 mm, PN 6 under the road in already excavated trench. It involves supply and laying of HDPE pipe minimum at suitable depth. After laying of HDPE pipe, the trench should be refilled with same soil and restored to original position & pipe should be laid in trench such that possible to withdraw the cables for repair or replacement without disturbing the Railway work. The pipes shall be laid with a gradient to facilitate drainage of water and it shall be at right angle to the track. This above scope is including laying of cable in HDPE															

	pipe also. The contractor shall have to submit manufacturer's test reports of HDPE pipe.
48	Drilling of horizontal bore below track/road by pushing method for laying of RCC/HDPE/DWC pipe of various sizes. This item covers drilling of Horizontal bore by pushing method (trenchless technology) in all types of soil/rock for laying of RCC/HDPE/DWC pipe from 50 to 150 mm to 450 mm by pushing method in presence of Railway representative without disturbing the Railway track taking all necessary safety precautions related track and movement of trains. Horizontal boring will be done at minimum 1 Mtr. Below from ground level at railway track portion but in case, where bank height of track is high then boring should be such that outer side and under track RCC/HDPE/DWC pipes are in same alignment.
49	<p>This item covers supply &amp; laying of HDPE pipe including laying of cable in HDPE pipe in already excavated trench/bore under road/ ground/floor/railway track etc. as per requirement with technical specification 160 mm dia (OD), wall thickness between 6.2 mm to 7.1 mm, material grade PE-80 and class of pipe should be PN-4 with confirming to IS:4984/1995 or latest. Make:-Sangir, Dutron, NOCIL, Hasti, Reliance, Supreme or equivalent.</p> <p>After laying of HDPE pipe, the trench/horizontal bore should be refilled with same soil and restored to original position &amp; pipe should be laid in trench such that possible to withdraw the cable for repair or replacement. The pipe shall be laid at Minimum 01 Mtr. depth below the ground level with a gradient to facilitate drainage of water and it shall be right angle to the track. For each power line track crossings, contractor shall have to lay two length of pipe, for 02 Nos. of cable to be laid or as per direction of site engineer. Accessories related with laying of HDPE pipe like fittings, bends, joints/coupler, junction, flange, end cap etc. as per site requirement will be provided by contractor and no extra payment will be given for above items. The contractor shall have to submit manufacturer's test reports of HDPE pipe</p>
50	Supplying, laying of GI pipe size 50 mm dia. B class as per IS1239 for cable use as per site requirement.
51	Supplying, laying of GI pipe size 100 mm dia. B class as per IS1239 for cable use as per site requirement.
52	Supply and fixing of J' type cable route marker made of cast iron as per site requirement. Dimension and matter along with drawings Should be approved before supply.
53	Supply, installation, testing & commissioning of (300 mm width x 50 mm depth x 1.6 mm thickness) perforated Hot Dipped Galvanized Iron Cable Tray (Galvanization thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections fixed with MS Angle frame duly painted of 35 mm x 5 mm thick and all hardware complete in all respect as per site requirement.
54	Supply, fixing, testing and connecting of wall mounted heavy duty Air Circulator of 24"(600mm) size with built in 3 speed regulator, delivers Air 280Cu.m/min, similar to M/s Almonard make with all accessories complete confirming to IS specification with latest amendments. The Air Circulator is to be fixed by suitable MS clamps of size 50x50x6mm / flats of size 40x6mm with bolts and nuts etc., complete as desired by site engineer.
55	Supply & Erection of 7 mtrs high single arm hot dip galvanized Steel Octagonal "Smart poles" with galvanized base plate of 220 x 220 x 12 mm Foundation PCD 220 & Bolt size (4x20 mm dia X 700 mm) length in position including excavation of pit and filling the same with concrete 50 cm ground level from base plate mounting including supply of material as per OEM standard. The pole shall be galvanized internally & externally by single dipping method. The allied accessories such as single/ double cross arms, Bakelite sheet with MCB and stud terminals, clamping, etc. are included. The poles should be suitable for wind speed up to 169 Km/h (47 m/s) or as per wind zone where these are to be installed. Single/ Double arms of 1000 mm to 1500 mm length are to be provided as per the site requirement and the instructions of railway site engineer. The Bakelite sheet with MCB & stud terminals shall be provided in the base compartment of the poles. All the connecting terminals shall be properly tightened and crimped in order to avoid any loose connection. This also including connection of pole lights by MCB & wiring & complete charging of poles as per direction of site engineer. Make BAJAJ, GE, Crompton Greaves, Philips or similar
56	Supply installation, testing and commissioning of 0.5 HP Mono block Pump Make-CG/KSB/Luke/or similar.

57	Supply, Testing & Fixing of wall mounted cabin fan with regulator three speed, suitable for 220- 230 volt ,50HZ AC supply .Make- Bajaj or similar to Usha/ Crompton Greaves /Philips or similar .				
58	Supply of Phenolic top sheet wooden board size 7" x 4" with one no. 5x15 amp switch socket combined & one nos. 5 amp switch ISI mark make-Anchor/Vinay/ABB/Cona/Legrand or similar as per site requirement.				
59	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 with base plate of both side particle board for mobile with hanging clip as per site requirement.				
60	Supply, install, test & commissioning of load change over switch in steel sheet enclosure. The contractor shall have to supply, install, test & commissioning of front operated, AC-22A, 4P, 415V, 50Hz, 250Amps LT heavy duty On load changeover switch with steel sheet enclosure complete in all respect with all associate accessories confirming to IS13947-3 Make- Havells/L&T/HPL or similar equivalent make.				
61	Supply, Fixing, testing and commissioning of LED panel light of size 2'X2' similar to Philips Full Glow model No. RC 380B LED 34S-6500 L60W60 PSD OD S1 or similar				
62	<p>Design, manufacture, supply, fixing, testing and connecting of LED back lit double sided signage boards with IP-65 CRCA housing, vinyl print on acrylic sheet which is back lit with high grade, high brightness LED modules inbuilt SMPS driver, without battery backup. Operating voltage 80-270VAC. LED with L70 life of minimum 50,000 hours, LPM technology, including fabrication and supply of clamping arrangements as desired by site engineer. The Railway will decide the size, colour &amp; content to be printed on the signage Board. Signage board shall be pre wired with flexible copper wire and terminated in a connector from where 3- core flexible wire shall be brought out for connecting the board to ceiling rose, as per site requirement. The body of Glow sign board to be connected with earth. The pictogram and letter of desired color and size made by translucent vinyl sheet cut through computerized machine shall be pasted on acrylic sheet. Acrylic sheet with pictogram shall be fixed on CRCA/GI sheet powder coated box with suitable arrangement. Subject matter and pictogram can be seen in the standard look of signage available in office.</p> <p>Depth of box shall be approximately 3.5 inches (for single sided), 5.5 inches (for double sided) and made by 0.8 mm thick CRCA/GI sheet with powder coated having louvers for ventilation on two sides having suitable gaskets for protection against water and vermin ingress. Louvers should be covered with wire mesh to avoid entry of insects/lizards of suitable size as per requirement. LED light shall be provided inside the box in such way that intensity of light on both side of box (no dark spot) remains same. Size, quantity and place can be changed as per site requirement and Final decision of Sr.DEE/G/JU shall be acceptable and binding to the contractor.</p> <p><b>LED</b>-Clear cool white colour 5.00 mm LEDs of uniform intensity and luminosity shall be used for excellent Visibility. The intensity of the illumination is such that it shall be possible to read the information clearly from a distance of 20meters or higher. NICHIA /PHILIPS/LUMILIDE / AVAGO/Seol semiconductor/OSRAM make LED with L70 life of minimum 50,000 hours and with specified parameters as per latest data sheet of Original Equipment manufacturer shall be used. The contractor shall installed these as per site engineer instructions or as per requirement.</p> <p><b>SMPS</b>-All power supply units supplied are Switch Mode Power Supply type (SMPS) operated from AC source ranging from 80V to 270 Volts, 50 Hz AC, single phase. All the power units are tested at 50% load of maximum working capacity. Protection against transient coming in the power supply source origenerated by some other source is provided. Protection against voltage fluctuations of short durations is also provided. Over voltage and short circuit protection is incorporated within the power supply. Power factor should be &gt; 0.95.</p> <p>Signage board has following specifications-</p> <table><tr><td>No. of Lines per Board</td><td>As per requirement</td></tr><tr><td>Case Material</td><td>CRCA sheet of 0.8mm thickness</td></tr></table>	No. of Lines per Board	As per requirement	Case Material	CRCA sheet of 0.8mm thickness
No. of Lines per Board	As per requirement				
Case Material	CRCA sheet of 0.8mm thickness				

	Front Acrylic sheet thickness	3 mm
	Protection	IP 65
	Mounting Provision	Wall Mounting / Hanging With Clamps
	Dimensions of LED module (approx)	295 mm x 295 mm
	Nominal Voltage:	230 V AC
	Operating Voltage Range with SMPS power supply	150 V -260 V A.C
	LED type	5mm
	LED System Wattage	6 W max per square feet
	LED Wattage	0.06 W per LED
	LED control	Current regulator
	Luminosity	700mcd
	LED Color	Cool White
	Viewing angle	70 deg
	Solid angle	40 Deg
	Distance between LEDs	1.5" diagonally
	No of LEDs in each module	72
	LUX level inside the surface	1700 LUX @ 2" +/- 10%
	Color temperature	5500K/6500K
63	Supply, fixing and commissioning of 60 Amp. Capacity 240 volts, 50 Hz. for 10 KVA AT automatic Change Over Control and Distribution panels for CLS as per Latest RDSO Specification No. TI/SPC/ PSI/CLS/ 0020 with A & C Slip 1 to 4.	

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**Senior Divisional Electrical Engineer /General  
North Western Railway, Jodhpur**