

Name of Work: Ratlam Division - Upgradation of station including circulating area, water supply and approach roads at Ujjain, Laxmibai Nagar and Naikheri (Simhastha 2028).

Schedule A

Sr.	Description	Qty.	Unit	Rate	Total
1	Supply, erection, testing & commissioning of 5Mtr Octagonal pole with pit foundation, single arm bracket including connection as per specification.	Nos.	30	9954.00	298620.00
2	Supply, erection, testing & commissioning of 5Mtr Octagonal pole with pit foundation, Double arm bracket including connection as per specification.	Nos.	30	10610.49	318314.70
3	Supply and fixing of LED street light 70W including connection as per specification.	Nos	45	4308.00	193860.00
4	Supply, replacement, fixing, testing, connecting and commissioning of 60 Watt or above LED inverter street lights fittings with PDC housing, IP 66 and inbuilt battery backup with auto ON/OFF and dimming option(Dimming 50% on battery backup) and backup of up to 3 to 4 hrs. LED Luminaries:- (1) A complete LED lighting unit consisting of a light source and driver together with parts of distribute lights, to position and protect the light source ,and to connect the light source to a branch circuit. The light source itself may be an LED array and LED module, or an LED lamp.(2):-Supplied LED luminaries shall confirm to IS: IS:16101(2012) IS:16106(2012).Light Source(LED) in the Luminaries should be of make:- (1):-NICHIA/ CREE/OSRAM/ SEOUL/ PHILIPS/LUMILEDS/LEDNIUM. (2):- LEDs to IS:16105 (2012)IS:10322. IS:16108(2012),IS:10322,IEC:62471.T typeLED:- High power LED,SMD(Surface Mounting device).1.Inputoperating voltage :- 105-295 V AC.2:- Normal Voltage- 220VAC,3.Driver type: constant current driver with short circuit	Nos	45	7368.97	331603.65

<p>protection. 4.LED life:- >50000 burning hours .5.Depreciation:- 30%max.after 50000 burning hours.6.Control of distribution:-Full cut off.7.Surge protection:4KV (internal)+10KV(External Surge protection device) .8.Drive component :Industrial grade only.9.Efficiency of driver electronic: > 85%.10.Beam angle:>=140 degree along with road and >=80 degree across the road.11.Colourtemperature:5000-6500K.12.Colour rendering index(CRI):>=75.13.Ingress protection :IP-66.14.Lumen output:>120 lumens/watt.15.Power factor:>0.95. 16.Total harmonics distortion (THD):- <15%.17.Lamp cover :Toughened glass or UV stabiles poly carbonate.18.Finishing:Power coated/Anodized.19.Secondry optics: poly carbonate reflector/ polycarbonates lens.20.Construction of housing: extruded aluminum/CRCA/Pressure die cast aluminum.21.Mounting:Suitablefor existing pole/Truss/Lantern mounted.22.Certificate:Firm to submit LM80(In respect of LED used)& LM79(In respect of lumen are used) test certificate from National/International accredited Laboratory and OEM certificate for compliance of BIS/IEC.23.Warranty:Firm to submit warranty certificate for five year along with the supply. All fittings should be embossed/sticker with manufacturing date and warranty details at time of supply.20.The weight of fixture should be standard for better heat resistance of LED PCB. All fittings shall be fitted with new suitable bend/elbow with clamp and proper nut and bolt and connection with twisted twin flexible cord of minimum size 16/1 mm copper conductor as per relevant technical specification. Materials parameters</p>				
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	must remain unchanged during entire warranty period.				
5	Supply of material & wiring of light point/ceiling rose point by 1.5mm ² copper PVC cable casing-capping pipe/PVC pipe with earth wire without switch.	Nos.	90	133.06	11975.40
6	Supply of material & wiring of ceiling rose/ light point by 1.5mm ² copper PVC cable casing-capping pipe/PVC pipe with earth wire.	Nos.	60	317.38	19042.80
7	Supply & fixing of Switch board medium size as per specification.	Nos.	30	144.34	4330.20
8	Supply & fixing of Switch board small size as per specification.	Nos.	20	57.70	1154.00
9	Supply & fixing of 6Amp Cap. Plug socket 5Pin on existing board including connection.	Nos.	60	61.75	3705.00
10	Supply & fixing of 6Amp Cap. Plug socket 5Pin on separate board with wiring by copper cable PVC 2.5mm ² including connection.	Nos.	30	282.81	8484.30
11	Supply & fixing of 6/16 Amps Cap. Power Plug socket 5Pin on Separate board with wiring by copper cable PVC 2.5mm ² including connection.	Nos.	30	323.09	9692.70
12	Supply & fixing Double pole MCB On board including connection.	Nos.	30	332.28	9968.40
13	Supply of materials & wiring of sub main by copper cable PVC 2x2.5mm ² with earth wire in PVC casing-capping/PVC pipe including connection.	Mts.	400	45.00	18000.00
14	Supply of materials & wiring of sub main by copper cable PVC 2x4mm ² with earth wire in PVC casing-capping/PVC pipe including connection.	Mts.	350	99.67	34884.50
15	Supply and laying PVC Truncking system 50X50mm for sub main wiring as per specification.	Mts	600	204.63	122778.00
16	Supply, replacement, fixing, testing, connecting and commissioning of Inverter LED batten with square profile and poly carbonate/Extruded Aluminium channel. Lithium-Ion	Nos	40	759.28	30371.20

	battery with charging time 8 hours-10 hours and back up time up to 3 to 4 hours energy efficient luminaries complete with all accessories of capacity 20-watt,4 feet length, LED lamps with suitable current control driver circuit, suitable for surface/recessed mounting as per IS:10322.				
17	Supply & Fixing of LED Tube 18/20W Light fitting including connection as per specification.	Nos.	30	815.66	24469.80
18	Supply & Fixing of LED Tube 40W Light fitting including connection as per specification.	Nos.	45	1817.22	81774.90
19	Supply, erection, testing & commissioning of LED High Bay 120-Watt Luminaries as per specification.	Nos.	30	12800.59	384017.70
20	Supply & fixing of LED Area light 60-70W including connection as per specification.	Nos.	30	5531.68	165950.40
21	Supply & Erection of NEON LED Flexible Strip Light Frosted Rope String for decoration Strip having• Material: Anti-UV PVC •Power/Meter: 9W/M (IP rate IP67Water proof for outdoor) • Voltage: 220V, Blue • Average Lifespan (hrs.) : > 50000Hours as per specification.	Mts	600	310.40	186240.00
22	Supply, erection, testing & commissioning of 16 Mt. High mast Complete with head frame to install Luminaries and canopy complete with all accessories as per specification.	Nos.	4	144633.90	578535.60
23	Supply, erection, testing & commissioning of LED High Bay 250-Watt Luminaries as per specification.	Nos.	48	15690.68	753152.64
24	Fabrication, supply and erection of GI pipe fencing around the high mast, with 8 mast numbers B class GI pipes of 50mm dia., as per specifications.	Nos	4	21299.46	85197.84
25	Supply & fixing of Control panel 400 Amp. Cap. Complete with MCCB, change over switch with as per specification.	Nos.	2	220650.25	441300.50
26	Supply & fixing of Control panel 200A Complete with MCCB as per specification.	Nos.	3	85733.16	257199.48

27	Supply and fixing of 100Amp Capacity Control panel with MCCB& MCB's etc as per specification.	Nos.	6	16690.85	100145.10
28	Supply & fixing of Distribution box 63A complete as per specification.	Nos.	9	11987.58	107888.22
29	Supply of material, erection, testing & commissioning of GI pipe earthing arrangement as per specification.	Nos.	12	2401.68	28820.16
30	Supply and laying of GI Strip 25mm x 6mm for earthing as per specification.	Mts.	120	42.59	5110.80
31	Supply and fixing Perforated GI cable Tray 100x50mm as per specification.	Mts.	1200	427.82	513384.00
32	Supply of material, erection, testing & commissioning of cable junction box with bus bar as per specification.	Nos.	40	2300.57	92022.80
33	Supply of material, erection, testing & commissioning of cable junction box with 5 cutout /MCB as per specification.	Nos	40	1159.80	46392.00
34	Supply of material, erection, testing & commissioning of cable junction box with 2 cut out/ MCB bar as per specification.	Nos.	40	826.99	33079.60
35	Supply and laying 3 core, 2.5 sqmm, and flexible pvc insulated multicore FRLS pvc sheathed multistranded cables copper conductor for voltage grade up to 1100 v conforming to is-694:2010.	Met	500	120.00	60000.00
36	Supply and laying 3 core, 4 sqmm, and flexible pvc insulated multicore FRLS pvc sheathed multistranded cables copper conductor for voltage grade up to 1100 v conforming to is-694:2010.	Met	500	190.00	95000.00
37	Supply and laying 3 core, 6 sqmm, and flexible pvc insulated multicore FRLS pvc sheathed multistranded cables copper conductor for voltage grade up to 1100 v conforming to is-694:2010.	Met	1000	275.00	275000.00

38	supply and laying 4 core, 10 sqmm, flexible pvc insulated multicore frls pvc sheathed multistranded cables copper conductor for voltage grade upto 1100 v conforming to is-694:2010.	Met	1000	560.00	560000.00
39	Laying of 4core 400sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Mts	500	22.03	11015.00
40	Laying of four Core 300 sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Mts	500	19.28	9640.00
41	Laying of 4core 240sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Mts	500	19.28	9640.00
42	Laying of 4core 185sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8 SWG GI wire in existing trench/Pipe/ in air as per specification.	Mtr	500	19.28	9640.00
43	Laying of 4core 120sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Mts.	1500	22.03	33045.00
44	Laying of 4core 70sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Met	2000	22.03	44060.00
45	Laying of four Core 25sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Mts	3000	22.03	66090.00

46	Laying of four Core 16sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armoured Aluminium Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air as per specification.	Mts	2000	22.03	44060.00
47	Supply and laying of double walled corrugated DWC Pipes of size 120mm Outer dia & 103mm inner dia as per specification.	Nos	50	1632.33	81616.50
48	Supply and laying of 65 mm dia. DWC pipe complete as per specification.	Mts.	2000	54.34	108680.00
49	Design, manufacture, Erection and installation of display of wall / hanging / floor mounting type LED illuminated sign / direction boards in full elliptical / half elliptical / semi elliptical shape. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2 mm thickness. The text / graphics matter visibility shall be less than 160 deg. The approved colour text and graphics shall be printed / router cut on monomercalendared 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 4-8 W/ sq. ft and with brightness more than ambient light. Suitable size end cap of 1.5mm thick SS 304 should be provided.	Square Foot	120	2139.75	256770.00
50	Supply, installation, testing & commissioning of LED base name board of Railway station in English with power LED's, Driver and wiring of board as per specification given IN ENGLISH	No	2	67072.15	134144.30

51	Supply, installation, testing & commissioning of LED base name board of Railway station in Hindi with power LED's, Driver and wiring of board as per specification given.	No	2	56483.07	112966.14
52	Supply, installation, testing & commissioning of LED base Glow sign logo of western Railway & Indian Railway as per specification.	No	2	197080.09	394160.18
53	Supply, erection, testing & commissioning of On-Line UPS 2 KVA with isolation transformer suitable for single phase AC input and single-phase output, floor mounted type Back up time -120 minutes as per specification.	Nos.	3	76381.50	229144.50
54	SITC of Online UPS of Rating 5.0 KVA With Battery of Backup Time 120 Minutes as per as per specification.	Nos	2	145250.00	290500.00
55	Supply of Self drinking water cooler with (non-CFC refringent) energy efficient compressor, cooling capacity Ltrs/Hr.: 150, Type: Storage, Storage Capacity Ltrs.: 150, Rate of Max. Energy consumption watt: 1550 as per specification.	Nos.	6	47963.24	287779.44
56	Supply and fixing of Evaporative Jumbo Air Coolers (Desert Coolers), Floor Mounted as per specification	Nos	12	25000.00	300000.00
57	Supply and fixing of on load manual change over 200A as per specification.	Nos	3	22150.00	66450.00
58	Supply of material, erection, testing & commissioning of Auto change over switch 32 Amp as per specification.	Nos	3	3012.34	9037.02
59	Supply of material, erection, testing & commissioning of Auto change over switch 63 Amp as per specification.	Nos.	3	6638.91	19916.73
60	Digging of trench	Mts.	2200	123.31	271282.00
61	Digging of Pacci trench	Mts.	1085	313.33	339963.05
62	Supply and fixing of Distribution box with Rewire able switch fuse unit. (200A) as per specification.	Nos.	4	16206.32	64825.28

63	Supply, erection, testing & commissioning of Horizontal Mono Block submersible pump set. The pump set shall be supplied with squirrel cage type induction motor having dynamically balanced rotor & winding of PVC insulated copper wire & water filled, for giving output at duty point head 42 Mtrs at discharge 1300 LPM. The pump set shall be supplied with all relevant accessories. Pump motor shall be energy efficient in terms of HP, Head, Discharge/ Efficiency as per specification.	Nos	6	49207.10	295242.60
64	Supply, erection, testing & commissioning of Automatic Star delta Starter for submersible pump set as per specification.	Nos.	6	29079.14	174474.84
65	Supply erection of GI pipe as per specification.	Mts.	30	501.41	15042.30
66	Supply & erection of GI Coupling Socket as per specification.	Nos.	12	129.46	1553.52
67	Supply & erection of non-return valve as per specification.	Nos.	12	2986.25	35835.00
68	Supply & fixing of GI flange as per specification.	Nos.	12	135.25	1623.00
69	Supply & erection of GI bend as per specification.	Nos.	12	475.32	5703.84
70	Supply & laying of flat cable PVC copper 3 core 10mm ² as per specification.	Mts.	150	372.68	55902.00
71	Providing 100mm dia. GI/MS Pipe under track by pushing method as per specification.	Mts.	150	1662.01	249301.50
Rs. One Crore Three Lakh Twenty Thousand Five Hundred Seventy and Thirteen Paise Only					10320570.13

-: Special Term and Conditions: -

1. This works contract shall be governed by the General Conditions of Contract (GCC) – April 2022, as amended from time to time.
2. The completion period shall be **twelve (12) months** from the date of issue of the Letter of Acceptance (LOA).
3. The work shall be carried out as per the attached tender schedule.
4. Conditional tenders shall not be accepted.
5. The work shall be supervised by a Railway representative authorized by the Sr. DEE/P/RTM.
6. The work, if required, may be executed anywhere within Ratlam Division with the prior approval of Sr. DEE/P/RTM.
7. The Railway reserves the right to terminate the contract at any time by giving notice in accordance with the applicable provisions of the Railway GCC. In case of any dispute arising during the course of the contract, the decision of Sr. DEE (P)/RTM shall be final and binding, subject to provisions of GCC.
8. The quantities shown in the schedule are approximate. Payment shall be made based on the actual quantities executed.
9. The contractor shall take all necessary safety precautions. The Railway shall not be responsible for any personal injury, accident, or loss suffered by the contractor, its representatives, or any other person engaged by the firm.
10. Samples of all materials proposed to be used shall be submitted for approval to the Sr. DEE/P or the Railway representative authorized by Sr. DEE/P before use.
11. LED fittings shall conform to WR Specification No. WR/CCG/Specification/P/001 (Rev-01)/2018 dated 28-02-2018.
12. Leaflets, catalogues, and technical specifications of the materials shall be submitted along with the tender.
13. OEM test reports and delivery challans from the OEM/Authorized Dealer for the materials used shall be submitted to the Site Engineer. A copy of the same shall also be submitted to the office through the Site Engineer.
14. Space/room for storage of materials shall be provided by the Railway free of cost, subject to availability.
15. Released materials, if any, shall be handed over to the Railway with a Joint Receipt Note.
16. Any minor items of work, whether specifically mentioned in the scope of work or not, but required for completion of the work as per site requirements and for proper functioning/commissioning of the equipment, shall be deemed included in the scope of work and shall be executed by the contractor at no extra cost.
17. **Electrical Contractors License: The tendering firm must have valid Electrical Contractors License issued by any State Government in their own name or in the name of the firm. A copy of the license shall be uploaded along with the tender offer failing which the offer shall be summarily rejected. The license must be valid as on the date of opening of the tender. If the Electrical Contractors License has expired as on the date of opening of tender, the license renewal documents must be uploaded along with the copy of the license. The Contractor shall possess valid Electrical Contractor License throughout the currency of the contract and the Consignee shall confirm the same. The contractor shall ensure timely renewal of license.**

18. All loading, unloading, and transportation required for successful completion of the work shall be arranged by the contractor at his own cost. Any damage caused to plaster or any other Railway property during execution of the work shall be made good by the contractor at his own expense, restoring the same to match the existing décor of the wall/ceiling, etc. No extra payment on this account shall be admissible.
19. The contractor shall carry out all electrical works in accordance with the Indian Electricity Rules, 1956, and the Central Electricity Authority Regulations (CEAR), 2023, as amended from time to time.
20. One Railway Electrical Technician/Assistant may be deputed from time to time for shutdown, jumpering, etc. The contractor's Site In-charge shall ensure adherence to proper shutdown and safety procedures.
21. The work shall ordinarily be carried out during daytime. Work beyond normal working hours, if required, shall be undertaken only with prior approval of the concerned Railway supervisor, depending on local conditions.
22. Railway shall provide sites for erection as and when made available, subject to progress of work by various concerned departments.
23. **Payment Conditions:**
 - i. Payment shall be made based on the actual quantities executed, strictly as per Railway's tender terms and conditions. Payment shall be released only after erection, testing, and commissioning of the respective items (where applicable), fulfillment of the provisions of the Railway's Standard General Conditions of Contract, and certification of successful completion by the Site Engineer.
 - ii. All applicable taxes, duties, GST, and other Government levies shall be deducted as per rules in force at the time of bill preparation. The contractor shall have no objection in this regard. The rates quoted by the tenderer shall be inclusive of all taxes, duties, GST, and other Government levies.
24. Contractor shall have to mandatory updating of Labour data on Railway's **Shramik Kalyan portal**.
25. The contractor shall ensure strictly to submit **Police verification** of each contractual labor/ staff provided during course of contract.
26. The Contractor shall be responsible to ensure, compliance with the provision of the **Minimum Wages**.
27. **Maintenance/Warranty/Guarantee Period: -**
 - i. For Schedule A – Item Nos. 3, 4, 16, 17, 18, 19, 20 and 23, the warranty/ guarantee/ maintenance period shall be **sixty (60) months** from the date of successful completion of work, as certified by the concerned SSE. The Security Deposit shall be released accordingly.
 - ii. For all other items under Schedule A (except 3, 4, 16, 17, 18, 19, 20 and 23), the warranty/guarantee/maintenance period shall be **Twelve (12) months** from the date of successful completion of work, as certified by the concerned SSE. The Security Deposit shall be released accordingly.
 - iii. In case any item fails during the warranty/guarantee/maintenance period, the contractor must attend to the defect within **seven (7) days** from the date of intimation by the Railway. Failing which, a penalty as decided by the Sr. DEE/P/RTM shall be imposed and deducted from the contractor's Bills/Security Deposit.
28. **Inspection: -** Schedule 'A' Item Nos. 22 and 23 shall be subject to RITES inspection to ensure that the work is executed strictly in accordance with the approved

specifications, drawings, and that the materials supplied are of the best quality suitable for the intended purpose. Any defects or discrepancies observed during inspection shall be rectified immediately by the Contractor at no additional cost.

The following items shall specifically be subject to inspection and approval by RITES prior to supply:

- Schedule A Item No. 22 and 23.

The Contractor shall supply these materials only after inspection approval by RITES. Materials may be rejected at a later stage if any defect is detected during erection or commissioning.

No extra payment shall be made towards RITES inspection. It shall be the sole responsibility of the Contractor to arrange for RITES personnel and coordinate their site visit for inspection. The Railway shall only facilitate coordination for such inspection.

Definition of Similar Nature of Work: Wiring/ Re-wiring in buildings with associated electrical works like control gear and protection arrangements in residential buildings or service buildings. OR Lighting arrangement in buildings, circulating area, yard, street etc. with associated electrical works. OR wiring/Rewiring, Lighting arrangement in building with associated electrical works.

Technical specification**Schedule B**

Name of work: Ratlam Division - Upgradation of station including circulating area, water supply and approach roads at Ujjain, Laxmibai nagar and Naikheri (Simhastha 2028)

Item No. 01	Supply, erection, testing & commissioning of 5Mtr Octagonal pole with pit foundation, single arm bracket including connection.
Explanation	<p>This includes supply, erection, testing & commissioning of 5Mtrs. octagonal Pole. The octagonal poles shall be OCTAGONAL in cross section and be continuously tapered with only one longitudinal welding thereby giving an elegant & sleek look aesthetically. The welding of pole shafts shall be done by Submerged Arc Welding (SAW) process. The poles shall be provided with base flange of suitable thickness with a provision for fixing 4 foundations bolts. This also includes supply and erection of one no. MCB of suitable capacity.</p> <p>Material of Construction: Octagonal poles: High Tensile steel as per IS standards conforming to grade S355JO or equivalent.</p> <p>Pole sections: The Octagonal Poles shall be manufactured in single section without any joint. The thickness of sheet shall not be less than 3mm in any case. The cutting of sheet before bending on press brake shall be by cold shearing method to avoid development of stresses in steel. Such stresses in steel result in twisting near the top of the pole. Since these poles shall be installed in areas where aesthetics is of prime importance. Hence, such cold cutting must be adhered to</p> <p>Galvanization: The octagonal poles shall be hot dip galvanized (internally & externally) as per IS 2629/IS 2633/IS4759 Standards.</p> <p>Top Mountings: The luminaries shall be fixed on single arms bracket of minimum 500mm length. The bracket shall be manufactured from suitable MS pipes which are duly galvanized.</p> <p>Foundation: Construction of suitable shallow foundation (or as per manufacture design/ recommendation) with 1:2:4 concrete for the octagonal pole 1 meter $\pm 10\%$ depth. Contractor has to submit detailed manufacturer drawing for this purpose with all materials and labour with 3 days curing.</p> <p>Make: - Transrail / Valmont / Philips / Bajaj / RR ispat/ Crompton / Wipro / AMBICA / Bikana / Vankal.</p>
Item No. 02	Supply, erection, testing & commissioning of 5Mtr Octagonal pole with pit foundation, double arm bracket including connection.
Explanation	<p>This includes supply, erection, testing & commissioning of 5Mtrs. octagonal Pole. The octagonal poles shall be OCTAGONAL in cross section and be continuously tapered with only one longitudinal welding thereby giving an elegant & sleek look aesthetically. The welding of pole shafts shall be done by Submerged Arc Welding (SAW) process. The poles shall be provided with base flange of suitable thickness with a provision for fixing 4 foundations bolts. This also includes supply and erection of one no. MCB of suitable capacity.</p> <p>Material of Construction: Octagonal poles: High Tensile steel as per IS standards conforming to grade S355JO or equivalent.</p> <p>Pole sections: The Octagonal Poles shall be manufactured in single section without any joint. The thickness of sheet shall not be less than 3mm in any case. The cutting of sheet before bending on press brake shall be by cold shearing</p>

	<p>method to avoid development of stresses in steel. Such stresses in steel result in twisting near the top of the pole. Since these poles shall be installed in areas where aesthetics is of prime importance. Hence, such cold cutting must be adhered to</p> <p>Galvanization: The octagonal poles shall be hot dip galvanized (internally & externally) as per IS 2629/IS 2633/IS4759 Standards.</p> <p>Top Mountings: The luminaries shall be fixed on double arms bracket of minimum 500mm length each side. The bracket shall be manufactured from suitable MS pipes which are duly galvanized.</p> <p>Foundation: Construction of suitable shallow foundation (or as per manufacture design/ recommendation) with 1:2:4 concrete for the octagonal pole 1 meter $\pm 10\%$ depth. Contractor has to submit detailed manufacturer drawing for this purpose with all materials and labour with 3 days curing.</p> <p>Make: - Transrail / Valmont / Philips / Bajaj / RR ispat/ Crompton / Wipro / AMBICA / Bikana / Vankal.</p>
Item No. 03	Supply & fixing of LED Street light 70W including connection.
Explanation	<p>This includes supply, Erection, testing & commissioning of aesthetically designed outdoor 70-Watt (+/- 5W) LED Street Light fitting with luminous efficacy ≥ 100 made from pressure die-cast LM6/ADC12/LM24 housing with optimal heat sink for better thermal dissipation and toughened glass or UV stabilized polycarbonate cover with high transmission index for superior light output. The fitting shall be as per Western Railways' specification no. WR/CCG/Specification/P/001 (Rev-01)/2018 of Dt. 28-02-2018. The fitting shall be designed for IP: 65 class protection.</p> <p>The price shall also cover for fixing, testing and commissioning of the above street light fitting on pole/truss/roof/wall by fabrication and supply of MS/G.I. pipe of required length, diameter and shape and fixed with M.S. clamps made from M.S. flat of 40 x 5 mm size duly painted with nut, bolts and washers of 12 mm diameter. The connection shall be carried out through ISI marked, PVC insulated, and flexible three-core copper wire of size 24/0.20 mm from the existing overhead line/catenaries/junction box as per site conditions. The connection cord shall be protected by suitable size of heavy-duty flexible PVC conduit</p>
Item No. 04	Supply, replacement, fixing, testing, connecting and commissioning of 60 Watt or above LED inverter street lights fittings with PDC housing, IP 66 and inbuilt battery backup with auto ON/OFF and dimming option (Dimming 50% on battery backup) and backup of up to 3 to 4 hrs.
Explanation	<p>Supply, replacement/ fixing, testing, connecting and commissioning of 60 Watt or above LED inverter street lights fittings with PDC housing, IP 66 and inbuilt battery backup with auto ON/OFF and dimming option (Dimming 50% on battery backup) and backup of up to 3 to 4 hrs.</p> <p>LED Luminaries: -</p> <p>(1): A complete LED lighting unit consisting of a light source and driver together with parts of distribute lights, to position and protect the light source, and to connect the light source to a branch circuit. The light source itself may be an LED array and LED module, or an LED lamp.</p> <p>(2): Supplied LED luminaries shall confirm to IS: IS:16101(2012) IS:16106(2012). Light Source (LED) in the Luminaries should be of make: - (1):-NICHIA/ CREE/OSRAM/ SEOUL/ PHILIPS/LUMILEDS/LEDNIUM. (2):-LEDs to</p>

	<p>IS:16105(2012) IS:10322. IS:16108(2012), IS:10322, IEC:62471. Type LED: - High power LED, SMD (Surface Mounting device).</p> <p>1: Input operating voltage: -105-295 V AC.</p> <p>2: - Normal Voltage-220VAC,</p> <p>3: Driver type: constant current driver with short circuit protection.</p> <p>4: LED life: - >50000 burning hours.</p> <p>5: Depreciation: - 30%max. after 50000 burning hours.</p> <p>6: Control of distribution: -Full cut off.</p> <p>7: Surge protection:4KV (internal)+10KV (External Surge protection device).</p> <p>8: Drive component: Industrial grade only.</p> <p>9: Efficiency of driver electronic: > 85%.</p> <p>10: Beam angle:>=140 degree along with road and >=80 degree across the road.</p> <p>11: Colour temperature: 5000-6500K.</p> <p>12: Colour rendering index (CRI):>=75.</p> <p>13: Ingress protection: IP-66.</p> <p>14: Lumen output:>120 lumens/watt.</p> <p>15: Power factor:>0.95.</p> <p>16: Total harmonics distortion (THD):-<15%.</p> <p>17: Lamp cover: Toughened glass or UV stabiles poly carbonate.</p> <p>18: Finishing: Power coated/Anodized.</p> <p>19: Secondary optics: poly carbonate reflector/ polycarbonates lens.</p> <p>20: Construction of housing: extruded aluminum/CRCA/Pressure die cast aluminum.</p> <p>21: Mounting: Suitable for existing pole/Truss/Lantern mounted.</p> <p>22: Certificate: Firm to submit LM80(In respect of LED used) & LM79(In respect of luminaire used) test certificate from National/International accredited Laboratory and OEM certificate for compliance of BIS/IEC.</p> <p>23: Warranty: Firm to submit warranty certificate for five years along with the supply. All fittings should be embossed/sticker with manufacturing date and warranty details at time of supply.</p> <p>24: The weight of fixture should be standard for better heat resistance of LED PCB. All fittings shall be fitted with new suitable bend/elbow with clamp and proper nut and bolt and connection with twisted twin flexible cord of minimum size 16/1 mm copper conductor as per relevant technical specification. Materials parameters must remain unchanged during entire warranty period.</p>
item No. 05	Supply of material & wiring of light point/ceiling rose point by 1.5mm² copper PVC cable casing-capping pipe/PVC pipe with earth wire without switch.
Explanation	<p>This includes supply of materials and wiring of ceiling rose point with 1.5mm² single core copper stranded PVC insulated unsheathed FRLS cable in PVC pipe / PVC casing capping using separate PVC pipe/PVC casing capping. Tapping should be taken from Junction Box. This will include ceiling rose on Surface mounting plastic box of suitable size. All points shall be provided with earth wire 1.5mm² flexible copper conductors PVC insulated FRLS cable green colour inside PVC pipe /PVC casing-capping for earth and connected to general earthing arrangement.</p> <p><u>Make:</u> - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm²</p>

	<p>stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR/ BENLO make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI /BENLO/ KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Colour/white Colour conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN /KINZEL/ PRECISION/ MODI/ BENLO/ KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/ BENLO/ KING/ Wattera.</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S /RIDER/ JAINEX/ LEGRAND/ BENLO/KING/ Wattera.</p>
Item No. 06	Supply of material & wiring of ceiling rose/ light point by 1.5mm² copper PVC cable casing-capping pipe/PVC pipe with earth wire.
Explanation	<p>This includes supply of materials and wiring of Ceiling Rose / Light point with 1.5mm² single core copper stranded PVC insulated unsheathed FRLS cable in PVC pipe / PVC casing capping using separate/existing PVC pipe/PVC casing capping. This will include Ceiling Rose / Batten Holder on Surface mounting plastic box of suitable size & a modular switch on existing board / separate Surface mounting plastic box of size single module complete with cover plate. Modular switch and Batten holder/Ceiling rose shall be 6 Amp rating capacity minimum. All points shall be provided with earth wire 1.5mm² flexible copper conductor PVC insulated FRLS cable green color inside PVC pipe /PVC casing-capping for earth and connected to general earthing arrangement through main board / Sub board earth terminals.</p> <p><u>Make: - 1</u> PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR/ make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN /KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle /</p>

	<p>Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/ Wattera.</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S /RIDER/ JAINEX/ LEGRAND/KING/ Wattera.</p>
Item No. 07	Supply & fixing of Switch board medium size as per specification.
Explanation	<p>This includes supply of material & fixing of Surface mounting plastic board with modular cover Plate of 8-12 Module as per site requirement suitable to fix fan regulator, switches, plug sockets etc. complete with internal wiring. PVC box shall be as per IS14772. All cables are 2.5mm² flexible copper conductor FRLS PVC insulated cable inside should be provided between switches & plugs. Board should be fixed on wooden Gitties /PVC rowel plug with screws. The board & Cover plate shall be Off white / White Color. Modular Cover plate shall be glaze finished.</p> <p>Make: - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR/ make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera.</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p>
Item No. 08	Supply & fixing of Switch board small size as per specification.
Explanation	<p>This includes supply of material & fixing of Surface mounting plastic board with modular cover Plate of 3-4 Module as per site requirement suitable to fix fan regulator, switches, plug sockets etc. complete with internal wiring. PVC box shall be as per IS14772. All cables are 2.5mm² flexible copper conductor FRLS PVC insulated cable inside should be provided between switches & plugs. Board should be fixed on wooden Gitties/PVC rowel plug with screws. The board & Cover plate shall be Off white / White Color. Modular Cover plate shall be glaze finished.</p> <p>Make: - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\</p>

	<p>NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p>
<u>Item No.09</u>	Supply & fixing of 6Amp Cap. Plug socket 5Pin on existing board including connection.
Explanation	<p>This includes supply of material, fixing and commissioning of modular 6 Amps 5Pin socket with separate modular switch on existing board including connections.</p> <p>Make: - All Plug Socket & switch shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p>
<u>Item No. 10</u>	Supply & fixing of 6Amp Cap. Plug socket 5Pin on separate board with wiring by copper cable PVC 2.5mm² including connection.
Explanation	<p>This includes supply of material & commissioning one modular 5 pin,6 Amps socket with separate modular switch including wiring in PVC pipe / PVC casing capping by 2x2.5 Sq. mm single core copper stranded PVC insulated FRLS cable with 2.5 Sq. mm flexible copper conductor, PVC insulated FRLS cable green color for separate earth wire in separate Surface mounting plastic board with modular cover Plate of suitable Module.</p> <p>PVC box shall be as per IS14772. All cables are 2.5mm² flexible copper conductor FRLS PVC insulated cable inside should be provided between switches & plugs. Board should be fixed on wooden Gitties/PVC rowel plug with screws. The board & Cover plate shall be Off white / White Color. Modular Cover plate shall be glaze finished.</p> <p>Make: - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be</p>

	<p>provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p>
Item No.11	Supply & fixing of 6/16 Amps Cap. Power Plug socket 5Pin on Separate board with wiring by copper cable PVC 2.5mm² including connection.
Explanation	<p>This includes supply of material & commissioning one modular 5 pin, 6/16 Amps socket with separate switch including wiring in PVC pipe / PVC casing capping by 2x2.5 Sq. mm single core copper stranded PVC insulated FRLS cable with 2.5 Sq. mm flexible copper conductor, PVC insulated FRLS cable green color for separate earth wire, in separate Surface mounting plastic board with modular cover Plate of suitable Module.</p> <p>PVC box shall be as per IS14772. All cables are 2.5mm² flexible copper conductor FRLS PVC insulated cable inside should be provided between switches & plugs. Board should be fixed on wooden Gitties/PVC rowel plug with screws. The board & Cover plate shall be off white / White Color. Modular Cover plate shall be glaze finished.</p> <p>Make: - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p>

Item No.12	Supply & fixing Double pole MCB On board including connection.
Explanation	<p>This includes supply of material and fixing of mini/Modular type double pole MCB 5-32 Amp capacity in existing main/sub-board including connections. MCB Shall be as per IS/IEC 60898-1.</p> <p>Make: - All MCBs shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND / Wattera.</p>
Item No.13	Supply of materials & wiring of sub main by copper cable PVC 2x2.5mm² with earth wire in PVC casing-capping / PVC pipe including connection.
Explanation	<p>This includes supply of material & wiring by 2x2.5mm² single core copper stranded PVC insulated FRLS cable in separate or existing PVC pipe / PVC casing capping from one board to another with separate earth wire 2.5mm² flexible copper conductor PVC insulated FRLS cable green Color inside PVC pipe /PVC casing-capping for earth and connected to general earthing arrangement.</p> <p>Make: - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness 2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera.</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera.</p>
Item No.14	Supply of materials & wiring of sub main by copper cable PVC 2x4mm² with earth wire in PVC casing-capping/PVC pipe including connection.
Explanation	<p>This includes supply of material & wiring by 2 x 4 mm² single core copper stranded PVC insulated FRLS cable in separate or existing PVC pipe / PVC casing capping from one board to another including separate earth wire 4mm² flexible copper conductor PVC insulated FRLS cable green Color inside PVC pipe /PVC casing-capping for earth and connected to general earthing arrangement.</p> <p>Make: - 1 PVC CABLE: The PVC cable for wiring shall be 1.5mm² to 16mm² stranded copper 1100 Volt grade conforming to IS 694 & of PARAGON \ FINOLEX \ KEI \ HAVELLS \ PARALITE \ EMPIRE \ POLYCAB\ HPL \RR KABEL\ NEO-CAB\ NICCO\ ECOTEK\ ASIAN\ L&T\ AVOCAB\ ANCHOR make and ISI marked</p> <p>2. PVC PIPE: The PVC pipe should be 19 mm to 25mm-dia, minimum thickness</p>

	<p>2mm, gray/Cream colors and conforming to IS 9537 part –III. The PVC pipe shall be fixed straight on saddles rowel plug & junction box and bends are to be provided for inspection. PVC pipe should be PLAZA/ SHRINATH/ CROWN/ KINZEL/ PRECISION/ MODI/KING make.</p> <p>3. PVC CASING CAPPING: The PVC casing capping heavy duty double lock type of minimum 1inch of cream Color/white Color conforming to IS 14927 part-II and ISI marked. The make shall be PLAZA/ SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/KING only.</p> <p>4. ALL ACCESSORIES Like Switch, Plug Socket, Ceiling Rose, Holder (Angle / Batten Type) make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p> <p>5. PVC Box & Modular plate make shall be SSK / ANCHOR / HAVELLS / LEADER / CONA / HPL/ KOLORS/ NORTHWEST/ SCHNEIDER/ C&S/RIDER/ JAINEX/ LEGRAND/KING/Wattera..</p>
Item No.15	Supply and laying PVC Trunking system 50X50mm for sub main wiring.
Explanation	<p>The price shall cover for supply, fixing, testing and commissioning of ISI marked PVC Maxi Trunking (casing caping) of size 50 x 50 mm with all accessories. The PVC Maxi trunking shall be fixed at site by fabricated clamp of 18 SWG GI sheet at distances not more than 1.5 meters by machine screw/GI nut bolts, washers etc. The existing power cables shall be laid in the PVC Maxi trunking properly dressed and secured by means of suitable clamps/fasteners etc.</p> <p>The make shall be PLAZA/ SHRINATH/ CROWN / KINZEL/ PRECISION/ MODI/ BENLO</p>
Item No.16	Supply, replacement/ fixing, testing, connecting and commissioning of Inverter LED batten 20 Watt with square profile and poly carbonate /Extruded Aluminium channel. Lithium-Ion battery with charging time 8 hours-10 hours and back up time up to 3 to 4 hours
Explanation	<p>Supply, replacement/ fixing, testing, connecting and commissioning of Inverter LED batten with square profile and poly carbonate /Extruded Aluminium channel. Lithium-Ion battery with charging time 8 hours-10 hours and back up time up to 3 to 4 hours energy efficient luminaries complete with all accessories of capacity 20-watt, 4 feet length, LED lamps with suitable current control driver circuit, suitable for surface/recessed mounting as per IS:10322.</p> <p>LED -Luminaries: -</p> <p>(1) A complete LED lighting unit consisting of a light -source and river together with parts of distribute light, to position and protect the light source, and to connect the light source to a branch circuit. The light source itself may be an LED array and LED module, or an LED lamp.</p> <p>(2): -Supplied LED luminaries shall confirm to IS: 16101(2012) IS: 16106(2012). Light Source (LED) in the Luminaries should be of make: - (1): -NICHIA/ CREE/OSRAM/ SEOUL/ PHILIPS/LUMILEDS /LEDNIUM. (2): -LEDs to IS:16105(2012).IS:16108(2012), IEC:62471.1. Input operating voltage: -105-295 V AC.2: -Normal Voltage- 220V AC.</p> <p>(3): Driver type: constant current driver with short circuit protection (For tube light).</p> <p>(4): Control of distribution: -Full cut off.</p> <p>(5): Drive component: Industrial grade only.</p> <p>(6): Efficiency of driver electronic:>= 85% (For tube light).</p>

	<p>(7): Colour temperature:5000-6500K (For tube light).</p> <p>(8): Colour rendering index (CRI):>75(For tube light).</p> <p>(9): Ingress protection: IP-20.</p> <p>(10): Lumen output: >=100 lumens/watt@Max.350mA drive current (For tube light).</p> <p>(11): Power factor:->0.90(For tube light).</p> <p>(12): Total harmonics distortion (THD): - <20% (For tube light).</p> <p>(13): Lamp cover: Acrylic cover which does not result in loss of lumens.</p> <p>(14): Finishing: Power coated /Anodized.</p> <p>(15): Secondary optics: poly carbonate reflector/ poly carbonate lens.</p> <p>(16): Construction of housing: extruded aluminum/CRCA/Pressure die cast aluminum.</p> <p>(17): Mounting: Suitable for surface mounting/recessed mounting.</p> <p>(18): Certificate: Firm to submit LM80(In respect of LED used) & LM79(In respect of luminaire used) test certificate from National/International accredited Laboratory and OEM certificate for compliance of BIS/IEC.</p> <p>(19): Warranty: Firm to submit warranty certificate for five years along with the supply. All fittings should be embossed/sticker with manufacturing date and warranty details at time of supply.</p> <p>(20): The weight of fixture should be standard for better heat resistance of LED PCB. All fittings shall be fitted as surface mounting/recessed mounting with twisted twin flexible cord of minimum size 16/0.2 mm copper conductor as per relevant technical specification. Material parameters must remain unchanged during entire warranty period.</p>
Item No. 17	Supply & Fixing of LED Tube Light fitting 18/20Watt including connection.
Explanation	<p>This includes supply of material, fixing, testing & commissioning of 1 x 18/20-Watt LED batten fitting with luminous efficacy ≥ 100. The fixture shall be of CRCA channel finished with white polyester powder coating with high UV and corrosion resistance. The fixture shall be equipped with end caps, push fit type lamp holders and mains connector to directly fix 4 feet long LED tube. The LED lamp shall be of 18/20 Watt as per Western Railways' specification no. WR/CCG/Specification/P/001 (Rev-01)/2018 of Dt. 28-02-2018. The tube shall be of polycarbonate material. The entire fixture shall be of reputed quality and make.</p> <p>The price shall also cover for fixing testing and commissioning of the complete fitting at site by means of bracket made from GI flat of 25 x 3 mm with nuts, bolts and washers or on heavy duty, ISI marked PVC square box as per site requirement. Connection shall be given by means of 24/0.2 mm three-core flexible copper wire through connector and heavy-duty flexible PVC conduit</p>
Item No.18	Supply & fixing of LED Tube Light fitting 40W including connection
Explanation	<p>This includes supply of material, fixing, testing & commissioning of 4 feet long 40-Watt SMD LED luminary fitting suitable to works on 230 V AC 50 Hz with luminous efficacy minimum 100. The fixture shall be of CRCA channel finished / polycarbonate body with high UV and corrosion resistance diffuser. driver efficiency >85%, THD < 10%, CCT > 6000 deg K, CRI>75, IP-65, surge protection approx. 3 KV & ISI marked confirming to IS 10322 or latest, surface/ hanging mounting with LM 79, LM 80 reports. The fitting shall be as per Western Railways' specification no. WR/CCG/Specification/P/001 (Rev-01)/2018 of Dt. 28-02-2018.</p> <p>The price shall also cover for fixing testing and commissioning of the complete</p>

	fitting as per site feasibility. Connection shall be given by means of 24/0.2 mm three-core flexible copper wire through connector and heavy-duty flexible PVC conduit.
Item No.19	Supply, erection, testing & commissioning of LED High Bay /Flood light 120-Watt Luminaries.
Explanation	This includes supply, Erection, testing & commissioning of LED High Bay/flood light luminary 120-Watt capacity with luminous efficacy ≥ 100 made from pressure die cast aluminum housing, toughened front glass cover, fitted with secondary optics, heat sink and integrated electronic driver for long life with IP 65 protection class for provision on High Mast. The fitting shall operate on 230 Volt, 50 Hz AC supply and shall be as per Western Railways' specification no. WR/CCG/Specification/P/001 (Rev-01)/2018 of Dt. 28-02-2018 of reputed quality and make. The price shall also cover for fixing, testing and commissioning of the above fitting by suitable suspension clamp/bracket made from G.I. flat of 40 x 6 mm (approx) duly painted with nut, bolts and washers of 12 mm diameter (approx) shall be provided as per site requirement. Connection shall be given by means of 24/0.2 mm three-core flexible copper wire and the connection cord shall be protected by suitable size of heavy-duty flexible PVC conduit.
Item No. 20	Supply & fixing of LED Area Flood light 70W including connection.
Explanation	This includes supply, Erection, testing & commissioning of energy efficient LED Area light /flood light luminary 70 Watt (+/-5%) capacity with luminous efficacy ≥ 100 made from pressure die cast aluminum housing, toughened front glass cover, fitted with secondary optics, heat sink and integrated electronic driver for long life suitable for working on 240 Volt, 50 Hz AC supply .The fitting shall be as per Western Railways' specification no. WR/CCG/Specification/P/001 (Rev-01)/2018 of Dt. 28-02-2018. The fitting shall be designed for IP: 65 class protection. The price shall also cover for fixing, testing and commissioning of the above fitting on pole/truss/roof/wall by fabrication by suitable clamp/bracket made from G.I. flat of 40 x 6 mm approx. duly painted with nut, bolts and washers of 12 mm diameter as per site requirement. The connection shall be carried out through ISI marked, PVC insulated, flexible three-core copper wire of size 24/0.20 mm from the existing ceiling rose /catenaries/junction box as per site conditions. The connection cord shall be protected by suitable size of heavy-duty flexible PVC conduit.
Item No. 21	Supply & Erection of NEON LED Flexible Strip Light Frosted Rope String for decoration. Strip having• Material: Anti-UV PVC •Power/Meter: 9W/M (IP rate IP67Water proof for outdoor) • Voltage: 220V, Blue • Average Lifespan (hrs): > 50000Hours • as per specification.
Explanation	The price shall cover design, supply, erection, testing and commissioning of NEON LED Flexible Strip Light Frosted Rope String for decoration. Strip having Material: Anti-UV Milky white PVC, Power/Meter: 9W/M (IP rate IP67 Waterproof for outdoor), Voltage: 220V, Blue, Average Lifespan (hrs): > 50000 Hours.
Item No. 22	Supply, erection, testing & commissioning of 16 Mt. High mast Complete with head frame to install Luminaries and canopy complete with all accessories.
Explanation	I) SCOPE: The scope of this specification covers supply, installation, testing and

commissioning of the complete lighting system, using Raising and Lowering type of High mast Towers, including the Civil Foundation Works.

A. SUPPLY

1. High Mast Shaft complete with all accessories
2. Foundation Bolt Set
3. Control panel

B.DESIGN

1. Foundation design to be done as per the soil nature
2. Complete high mast design as per the state of art technology.

C.ERECTION

1. Excavation of soil
2. Erection of foundation
3. Erection of mast
4. Erection of control panel
5. Erection of winch and rope drum
6. Erection of lantern carriage
7. Erection of luminaries, lamps and cable
8. Assembly of complete system

D. TESTING & COMMISSIONING

1. Connection of 3 Phase, 415 V power supply
2. Switching on and adjusting focus of lamps
3. Checking operation of lantern carriage manually and automatically.

Specification of 16-Meter-High Masts: -

HIGH MAST SHAFT	
Height of mast	16 Meter
No. of sections	Two
Material construction	S 355 grade as per BS-EN10 025
Bottom A/F	360 mm (Minimum) or as per manufacturer's standard
Top A/F	150 mm (Approximate) or as per manufacturer's standard
Plate thickness	3 mm or (As per Manufacturer's design)
Section length	8300 mm (Approximate) or as per manufacturer's standard
Cross section of Mast (Nos.)	20 side polygon or (As per Manufacturer's design).
Standard of galvanisation	As per BS EN ISO 1461
Size of opening and door at base	1200x250mm or as per manufacturer's standard
Diameter of base plate	520 mm Approx or as per manufacturer's standard
Thickness of base plate	25 mm Approx or as per manufacturer's standard
Lightning protection finial	G.I single spike of length 1200 mm (Approximate)
I. LANTERN CARRIAGE	
Material of construction	50 NB ERW Class B - M. S. Pipe

Diameter of carriage ring	450 mm (ID) Approx or as per manufacturer's standard
Construction	08 Arm, Welded, 2 sections or as per manufacturer's standard
Provision of counter weight	As per requirement for balancing
Load carrying capacity	08 Luminaries, Symmetrical + 10%
II. TRAILING CABLE	
Conductor	Copper, 5 core, 2.5 sq mm Min. or as per manufacturer's standard
Insulation	PVC Flexible or as per manufacturer's standard
No. of circuits per mast	One or as per manufacturer's standard
III. WINCH / POWER TOOL	
Type	Single gear Double drum or as per manufacturer's standard
SWL of winch	As per manufacturer's standard
Method of operation	Integral Motor or as per manufacturer's standard
Motor capacity	1.5HP or as per manufacturer's design
No of speeds	6 Pole, single speed or as per manufacturer's design
Torque limiter	With mechanical tripping facility
IV. STAINLESS STEEL WIRE ROPE	
Grade	AISI 316
Construction	7/19 construction or as per manufacturer's standard
Number of ropes	Two, continuous or as per manufacturer's standard
Diameter	6 mm (Minimum) or as per manufacturer's standard
Braking load capacity	2350 kg x 2 or as per manufacturer's standard
V. FOUNDATION BOLTS	
Number of foundation bolts	8 nos. or (As per manufacturer's design)
PCD of foundation bolts	445 mm or (As per Manufacturer's design)
Type	TS 600 or (As per Manufacturer's design)
Diameter	24/25 mm dia. or (As per Manufacturer's design)
Length of foundation bolts	850 mm long or (As per Manufacturer's design)
Make: - Transrail / Valmont / Philips / Bajaj / RR Ispat/ Crompton / Wipro/ AMBICA / Bikana / Vankal. II) APPLICABLE STANDARDS: a. IS 875 Part – 3, Wind Loading b. BS EN 10025:1993 – High Tensile Steel Sheets	

- c. IS 2062 – Mild Steel
- d. BS EN ISO 1461 – Galvanization
- e. IS 3459 / 2266 – Stainless steel Wire rope
- f. IS 9968 Par – 1 – Trailing Cable
- g. IS 325 – Motor
- h. IS 5135 – Welding

III) STRUCTURE:

The high mast shall be of continuously tapered polygonal cross section, at least 12 sided, presenting a good and pleasing appearance and shall be based on proven intension design conforming to the standards mentioned to give an assured performance and reliable service. The structure shall be structurally safe against wind loading as per IS:875 Part – III.

IV) CONSTRUCTION:

The high mast shall be fabricated from steel plates conforming to BS: EN 10025 or equivalent IS, cut and folded to form a polygonal section as stated in technical specification above and shall be telescopically joined and welded in conforming to BS:5135/AWS. The procedural weld geometry and the workmanship shall be exhaustively tested on the completed welds. Mast shall be supplied in sections of length as stated in technical specification above. Each section of the mast shall have only one longitudinal welding and there shall not be any circumferential weld inside or outside.

The mast shall be provided with fully penetrated flange, which shall be free from any lamination or incursion. The welded connection of the based 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 mast shall be hot dip galvanized internally and externally, with each section galvanized through single dip process as per BS EN ISO 1461.

V) DOOR OPENING:

An adequate door opening shall be provided at the base of the mast and the opening shall be such that it permits clear access to equipment like winches, cables, plug and socket etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weather proof door, provided with a heavy-duty double internal lock with special paddle key, and a provision for pad lock. The door opening shall be carefully designed and reinforced with welded steel section so that the mast section at the base shall be unaffected and undue buckling of the cut portion is prevented.

VI) DYNAMIC LOADING FOR THE HIGH MAST:

The mast structure shall be suitable to sustain an assumed maximum reaction arising from a wind speed confirming to IS:875 (3 second gust) and shall be measured at a height of 10 meter above ground level. The design life of the mast shall be minimum of 25 years.

VII) LANTERN CARRIAGE

(i) Fabrication:

	<p>The lantern carriages are to be fabricated from steel tubes in two halves. Holes are to be provided in the bottom side of arm tubes to act as conduit for wires. The whole assembly is hot deep galvanised. A PVC lining is to be provided in the inner side of carriage to avoid any metal contact with mast surface. The lantern carriage is normally designed as per the requirement of illumination design as it houses the luminaries & its control gear boxes. Junction boxes are provided on the carriage for terminating the trailing cable.</p> <p>(ii) Junction Box: Weather proof junction box made of cast Aluminium shall be provided on the carriage assembly as required, from which the inter-connections to the designed number of floor light luminaries and associated control gears fixed on the carriage shall be done.</p> <p>(iii) Provision of counter weight for balancing the lantern carriage, if required as per site condition and instructed by Site engineer should also be done.</p> <p>VIII) Raising and Lowering Mechanism: For installation and maintenance of luminaries and lamps, it will be necessary to lower and raise the Lamp 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.</p> <p>(i) Winch: - The winch is comprised of double drum, completely self-sustaining without the need for brake shoe, springs or clutches. There is a permanent oil bath for self-lubrication. The drums are to be properly grooved to provide a perfect seat for wire ropes. The winch is normally be operated by an electrical power tool however there is a provision for manual operation also by means of manual handle. The winches are type tested and test certificate is to be submitted along with supplies.</p> <p>(ii) HEAD FRAME: - The hot dip galvanized head frame is to be designed as a capping unit of the mast is of welded steel construction and provided with guides and separators between the ropes and cable. The LM6 Aluminium pulleys with bush bearing mounted through stainless steel shaft shall be suitable to accommodate wire ropes and multi core trailing cable. The head frame is provided with guides and stops with PVC buffer for the docking of Luminaries carriage. The pulley assembly is covered by a hot dip galvanized canopy.</p> <p>(iii) WIRE ROPES: - The stainless-steel wire ropes are generally be of 6 mm Dia, 7/19 construction with central core being stainless steel only. The grade of wire ropes is in accordance to AISI 316. The breaking load of each rope is not less than 2350 Kg giving a factor of safety of more than 5 for the system at full load. The end construction of rope for the winch drum is fitted with copper tellurite and for two continuous ropes, the end termination in Luminaries carriage is with stainless steel thimble and copper splicing and for others with stainless steel thimble and bull dog grips. Two continuous wire ropes are normally used for in-tension systems which are more reliable & safer.</p> <p>(iv) POWER TOOL FOR THE WINCH: - A suitable, high powered, electrically driven, internally mounted power tool, with manual override shall be supplied for the raising and lowering of the lantern carriage for maintenance purposes. The speed of the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of required rating. The power tool shall be supplied</p>
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	<p>complete with suitable control. The capacity and speed of the electric motor used in the power tool shall be suitable for lifting the designed load installed on the lantern carriage.</p> <p>The power tool mounting shall be so designed that it will not only self-supporting but also aligns the power tool perfectly with respect to the winch in case of problem 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 load 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 load 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.</p> <p>IX) ELECTRICAL SYSTEM: -</p> <p>a. Earthing Terminals: Earth terminal using 12 mm diameter hot dip galvanized bolts are provided on the door stiffener of the mast for lightning and electrical earthing of the mast.</p> <p>b. Feeder Pillar: Each mast is provided with a feeder pillar, housing 63A TPN MCB incomer, single dial time switch and 45A contactor for automatic switching on and off of luminaries, two 9A Contactors and raise lower hold on push buttons switches for motor operation. The outgoing terminals are normally of 16 sq. mm for power cable and 2.5 sq. mm for motor. The feeder pillar box is constructed of 14 SWG CRCA sheet finished with two Coates of red oxide primer & grey enamel paint</p> <p>NOTE: Foundation shall be constructed as per the recommended by OEM along with certification and Wind tunnel test report shall be submitted at the time of approval.</p>
Item No. 23	Supply, erection, testing & commissioning of LED High Bay/ Flood light 240-250-Watt Luminaries.
Explanation	<p>This includes supply, Erection, testing & commissioning of LED flood light high bay / flood light 240- 250-Watt capacity luminaries with luminous efficacy ≥ 100 made from pressure die cast aluminum housing, toughened front glass cover, fitted with secondary optics, heat sink and integrated electronic driver for long life with IP 65 protection class for provision on High Mast. The fitting shall operate on 230 Volt, 50 Hz AC supply and shall be as per Western Railways' specification no. WR/CCG/Specification/P/001 (Rev-01)/2018 of Dt. 28-02-2018 of reputed quality and make. The price shall also cover for fixing, testing and commissioning of the above fitting by suitable suspension clamp/bracket made from G.I. flat of 40 x 6 mm (approx.) duly painted with nut, bolts and washers of 12 mm diameter (approx.) shall be provided as per site requirement. Connection shall be given by means of 24/0.2 mm three-core flexible copper wire and the connection cord shall be protected by suitable size of heavy-duty flexible PVC conduit.</p>
item No.24	Fabrication, supply and erection of GI pipe fencing around the high mast, with 8 mast numbers B class GI pipes of 50mm dia., as per specifications.
Explanation	<p>This item includes fabrication, supply, erection, and installation of fencing around the high mast using chromium-plated Stainless Steel / Mild Steel (SS/MS) round or square pipes, complete with earthwork excavation, cement concrete</p>

foundations, welding, finishing, painting, and all associated works, as directed by the Engineer-in-Charge.

1. Posts / Pipes

- **Quantity:** 08 numbers of chromium-plated SS/MS round/square pipes of appropriate size.
- Pipes shall be erected equidistantly around the high mast.
- The number of pipes may be increased or decreased based on site conditions/ constraints with prior approval of Sr. DEE/P/RTM.

Pipe embedment:

- Approximately 900 mm (3 ft.) below ground level.
- Approximately 1200 mm (4 ft.) above ground level.

2. Foundation

- Foundation shall be of cement concrete ratio 1:3:6.
- Foundation height: Approximately 500 mm below and 150 mm (including white wash) above ground level.
- All excavation, backfilling, compaction, and disposal of surplus earth shall be included.

3. Location of Fence

- The distance of the fencing from the high mast shall be such that the entire lantern carriage along with light fittings is fully enclosed.
- The fencing arrangement shall ensure prevention of cattle entry into the fenced area.

4. Chains and Bracing

- Chromium-plated SS/MS chain of appropriate size shall be provided and welded to the pipes for strength.

Chain arrangement:

- Horizontal chains fixed at maximum 150 mm spacing
- Two diagonal chains provided in each bay between adjacent pipes
- Gap between ground level and bottom horizontal chain shall not exceed 150 mm
- Chains shall be fixed using split pins or welding, depending on site conditions.

5. Welding

- **Fillet welds:** Minimum 6 mm thickness
- **Butt welds:** Fully sealed and reinforced
- All welds shall be smooth, uniform, and free from defects.

6. Surface Treatment & Painting

- All pipes and chains shall be: Properly cleaned and treated with rust-proofing.

7. Design Approval

- The design, layout, dimensions, chain pattern, and aesthetic appearance shall be finalized as per site conditions.
- Detailed drawings and design shall be submitted for approval before execution of the work.

8. Completion

The entire work shall be completed in a workmanlike manner, meeting safety, durability, and aesthetic requirements, and to the satisfaction of the Engineer-in-Charge.

Item No.25	Supply & fixing of Control panel 400 Amp. Cap. Complete with MCCB, changeover switch with.		
Explanation	<p>This includes design, fabrication, supply, erection, testing and commissioning of 3 Phase LT panel, Front accessible, cubical type, totally enclosed and vermin proof, fully compartmentalized with concealed type hinged cover on front, bolted cover on back side. All hinged door and covers shall be provided with gasket. The Panel shall be Indoor type, Powder coated with both sides properly ventilated & having sufficient space for maintenance.</p> <p>The panel shall be fabricated with 16 SWG MS sheet and base is to be made from channel at the bottom suitable to support the entire panel. The anti-vibrating pads shall be supplied and provided at the bottom of the panel. Suitable capacity foundation or fabricated stand shall be made for Panel, if required as per site requirement.</p> <p>The LT control panel shall comprise of: -</p>		
	S r.	Item Description	Unit/Qty
	A	Incoming circuit	
	1	MCCB 4 pole 400 Amps ,36KA ,50Hz	02 Nos.
	2	Manual Change over switch 4 Pole, 415 V, 400 Amp On load changeover switch, panel mounted, confirming to IS / IEC 60947-3, IEC 60947-3, IS/IEC 60947-6-1, IEC 60947-6-1.	01 No.
	3	LED Phase indication lamps on both incoming	As per requirement
	B	Outgoing Circuit	
	1	MCCB 3 pole 200 Amps, 36KA, 50Hz	02Nos
	2	MCCB 3 pole 100Amps, 25KA, 50Hz	04Nos
	3	MCCB 3 pole 63Amps, 25KA, 50Hz	04Nos
	4	On line LED Phase indication lamps	As per requirement
	C	Fuse unit with fuses for instrument protection	03 Nos.
	D	Panel mounted multi-function meter with LCD display including CTs.	04 Nos.
	<p>a) One set of 3 Phase and 1 Neutral copper bus bar of suitable capacity, colour coated on epoxy support insulator shall be provided.</p> <p>b) Internal wiring shall be done through copper stranded PVC insulated cables of suitable size, ISI marked, IS 694 with suitable copper terminal ends.</p> <p>c) Two earthing terminals and danger board shall be provided.</p> <p>d) Suitable lugs and cable glands for all incoming and outgoing cables shall be provided.</p> <p>e) The size of cable chamber shall be adequate and sufficient to accommodate and connect the various cables according to the rating of the MCCB's / MCB's provided in the panel and sufficient space shall be</p>		

	<p>available.</p> <p>f) Labeling for identification of each feeder shall be fixed.</p> <p>g) Rubber mats of suitable thickness and size as per requirement shall be supplied.</p> <p>Make: -</p> <p>1. ACB Shall be of HPL / Havells / L&T /Siemens / Crompton / Standard/ BCH /C&S /Hager /Legrand/ Indo Asian /Benlo.</p> <p>2. Change Over Switch shall be of HPL/ Havells/ L&T /Siemens/ Crompton/ Standard/ BCH/ C&S/ Hager/ Legrand/ Indo Asian/ Benlo.</p> <p>3. MCCBs/MCBs shall be of HPL / Havells / L&T /Siemens / Crompton / Standard/ BCH/ C&S/ Hager/ Legrand/ Indo Asian/ Benlo, confirming to IS/IEC 60947 / EC 60898-1</p> <p>4. CTs shall be of AT / AE/ Selec/ Elmex/ Newtek Electricals.</p> <p>5. Multifunction meter shall be of Schneider/ ABB/ Siemens/ L&T/ Elmeasure/ Selec/ Trinity.</p>																																	
Item No.26	Supply & fixing of Control panel Complete 200A with MCCB As per specification.																																	
Explanation	<p>This includes design, fabrication, supply, erection, testing and commissioning of 3 Phase LT panel, Front accessible, cubical type, totally enclosed and vermin proof, fully compartmentalized with concealed type hinged cover on front. All hinged door and covers shall be provided with gasket. The Panel shall be Indoor type, wall mounted, Powder coated with both sides properly ventilated & & having sufficient space for maintenance.</p> <p>The panel shall be fabricated with 16 SWG MS sheet. Suitable capacity foundation or fabricated stand shall be made for Panel, if required as per site requirement.</p> <p>The LT control panel shall comprise of: -</p> <table><tr><th>S r.</th><th>Description</th><th>Unit/Qty</th></tr><tr><td>A</td><td>Incoming circuit</td><td></td></tr><tr><td>1</td><td>MCCB Four Pole 200 Amps ,36KA,415V,50Hz</td><td>01 No.</td></tr><tr><td>2</td><td>Phase indication LED Type lamps with /holders</td><td>03 Nos.</td></tr><tr><td>B</td><td>Outgoing Circuit</td><td></td></tr><tr><td>1</td><td>MCCB Four Pole, 100Amps, 25KA, 50Hz</td><td>02 Nos.</td></tr><tr><td>2</td><td>MCCB Four Pole, 63Amps, 25KA, 50Hz</td><td>04 Nos.</td></tr><tr><td>3</td><td>MCB Single pole 06-32 Amps,10KA,50Hz</td><td>04 Nos.</td></tr><tr><td>4</td><td>On line LED Phase indication lamps</td><td>As per requirement</td></tr><tr><td>C</td><td>Fuse unit with fuses for instrument protection</td><td>03 Nos</td></tr><tr><td>D</td><td>Panel mounted multi-function meter,3Lines LCD Display in 96X96 Sq mm, Flush mounted case, Accuracy class1.0 emf is vifpe</td><td>04 Nos.</td></tr></table>	S r.	Description	Unit/Qty	A	Incoming circuit		1	MCCB Four Pole 200 Amps ,36KA,415V,50Hz	01 No.	2	Phase indication LED Type lamps with /holders	03 Nos.	B	Outgoing Circuit		1	MCCB Four Pole, 100Amps, 25KA, 50Hz	02 Nos.	2	MCCB Four Pole, 63Amps, 25KA, 50Hz	04 Nos.	3	MCB Single pole 06-32 Amps,10KA,50Hz	04 Nos.	4	On line LED Phase indication lamps	As per requirement	C	Fuse unit with fuses for instrument protection	03 Nos	D	Panel mounted multi-function meter,3Lines LCD Display in 96X96 Sq mm, Flush mounted case, Accuracy class1.0 emf is vifpe	04 Nos.
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	D	Panel mounted multi-function meter,3Lines LCD Display in 96X96 Sq mm, Flush mounted case, Accuracy class1.0 emf is vifpe	04 Nos.																															
		<p>a) One set of 3 Phase and 1 Neutral copper bus bar of suitable capacity, colour coated on epoxy support insulator shall be provided.</p> <p>b) Internal wiring shall be done through copper stranded PVC insulated cables of suitable size, ISI marked, IS 694 with suitable copper terminal ends.</p>																																

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	60898-1																		
Item No.28	Supply & fixing of Distribution box 63Amp complete.																		
Explanation	<p>This includes supply, erection, testing, and commissioning of. LT Distribution Panel Company make, made from MS sheet indoor, wall mounting, double door type duly powder coated. Internal wiring shall be done through copper stranded PVC insulated cables ISI marked, IS 694 of suitable size, MS glands of suitable size for incoming/outgoing cable & panel to be secured on rebots. The danger board shall be fixed /provided on front cover. The incoming/ outgoing cable shall be provided with crimped terminal lugs.</p> <p>The board shall comprise of following: -</p>																		
	<table><tr><th>Sr.</th><th>Item Description</th><th>Unit/Qty</th></tr><tr><td>A</td><td>Incoming circuit</td><td></td></tr><tr><td>1</td><td>MCB Three Pole, 63 Amps, 50Hz</td><td>01 Nos.</td></tr><tr><td>2</td><td>Earthing terminals</td><td>02 Nos.</td></tr><tr><td>B</td><td>Outgoing Circuit</td><td></td></tr><tr><td>2</td><td>MCB Single Pole, 6 to 32 Amp, 50Hz</td><td>08 Nos</td></tr></table>	Sr.	Item Description	Unit/Qty	A	Incoming circuit		1	MCB Three Pole, 63 Amps, 50Hz	01 Nos.	2	Earthing terminals	02 Nos.	B	Outgoing Circuit		2	MCB Single Pole, 6 to 32 Amp, 50Hz	08 Nos
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<p>Make: -Distribution panel shall be of Make HPL / HAVELLS / L&T /SIEMENS / CROMPTON/ STANDARD/ BCH/C&S/ HAGER/ LEGRAND/ INDO ASIAN/ BENLO, confirming to EC 60898-1. All Accessories of same make of Panel.</p>																			
Item No. 29	Supply of material, erection, testing & commissioning of GI pipe earthing arrangement.																		
Explanation	<p>This includes supply of material & providing GI Pipe earthing arrangement with electrode GI pipe medium `B' class of 40 mm Dia, minimum thickness 3.2 mm & 3 Mt. long in length. GI pipe electrode shall be out tapered at the bottom and shall be provided with holes of 12 mm Dia at a distance of 7.5cms. In all sides from each other up to 2 Mt. of length from bottom The electrode shall be buried; vertical. The earthing shall be as per Drg. No. CEE-CCG (WR)/P-1870 (R2) & each pit should be provided with RCC Pit & Cover as per Drg. No. EL/Sr. DEE (P)-RTM/E-P/2010. Earth pipe should be buried and top should not be less then 20cm below ground level. The earth pipe should have GI socket cover with square nut welded at the top or a MS rod hook 10mm of U shape welded on socket of required size for easy opening. A flat GI Strip of size (Approx) 50 x 6mm and 250mm long with clamp of GI Strip of size 50X3mm (Approx) should be nut bolted & welded 10 cm below the top of the pipe with nut bolts of 10mm dia with flat & spring washers. All nuts, bolts and washer shall be galvanized or chromium plated.</p>																		
	<p>The pit should be refilled with charcoal & salt as per standard to achieve desired earth value. The GI wire should be of 6 SWG connected from earth electrode to main board/panel /meter box/earth terminal/pole etc. with necessary clamp. The Earth wire shall be laid in Green colour PVC sleeve of suitable size. The thickness of sleeve shall be 0.5mm minimum. Curing of pit for 7 days shall be done by contractor.</p> <p>The earth value shall be measured jointly by contractor and Rly official and shall be within prescribed limits i.e. 5 ohm. The pit & cover shall be white washed. The earth value shall be painted on each pit as per Rly. Practice with identification of Work Order.</p> <p>Earthing terminal shall be of heavy gauge GI sheet with fixing arrangement of</p>																		

	<p>2 Nos. bolting arrangement with GI nut bolts to be fixed on main board/panel /meter box/earth terminal/pole and all the earth leads shall be on earthing terminal. Earthing should conform to IS 3043.</p> <p>Make: - GI PIPE medium "B" Class as per IS- 1239 & make shall be TATA / ZENITH / JINDAL / PRAKASHSURYA.</p>
Item No. 30	Supply and laying of GI Strip 25mm x 6mm for earthing.
Explanation	This includes supply, laying and fixing of GI Strip of size 25x6 mm from earth pit to the LT panel board & electrical equipment's in proper manner with connection at both ends included nut bolt etc. The extension of the strip shall be welded for proper earth continuity.
Item No. 31	Supply of materials & lying of perforated GI cable Tray Size 100mm X 50mm with cover and fixing arrangement
Explanation	<p>The contractor shall have to supply and fix the perforated GI tray on Wall/ roof/as per site requirement for cable laying.</p> <ol style="list-style-type: none"> 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 100X50 mm. and Cable tray perforated shall be Approx 2 mm thick minimum with cover. 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.
Item No.32	Supply of material, erection, testing & commissioning of cable junction box with bus bar.
Explanation	<p>This includes supply, erection, testing and commissioning of thermoplastic IP 65/66 cable Junction box size approx. 295 x 225 x 122 mm ($\pm 15\%$ of Size), Halogen free & weather proof for outdoor installations with metric knockouts for cable entry with supply and fixing of well finished 04 Nos. copper Bus bars of 15mm X3mm size approx., suitable for 16/25mm² cable with lead sealing and with lug arrangement at each cable ends & labeling for circuit system. Junction boxes to be fixed on the pole/Covering shed or as per site with two Nos. clamps of suitable size. PVC Cable single core copper stranded PVC insulated unsheathed FRLS cable of suitable capacity in PVC pipe to connect both the junction box. The size of junction box shall be selected according to items to be erected/fixed, proper space for required connections and heat dissipation.</p> <p>Make: - Rittal, Schneider, Hensel, GE Vynecker, Connectwell, BCH, Siemens, Precision, CAPE spelsberg, Safybox.</p>
Item No. 33	Supply of material, erection, testing & commissioning of junction box with 5 cut out/MCB.
Explanation	<p>This includes supply, erection, testing and commissioning of thermoplastic cable junction box Halogen free & weather proof for outdoor installations with metric knockouts for cable entry, IP65/66 Junction box size approx. 260 x 210 x 116 mm ($\pm 15\%$ of Size) with supply and fixing of 16 Amp. 05 Nos. Cutouts/suitable MCB and neutral link of 15mm X 3mm size. Junction boxes to be fixed on the pole/Covering shed or as per site with two Nos. clamps of suitable size.</p> <p>The size of junction box shall be selected according to items to be erected/fixed, proper</p>

	space for required connections and heat dissipation. Make: - Rittal, Schneider, Hensel, GE Vynecker, Connectwell, BCH, Siemens, Precision, CAPE spelsberg, Safybox.
Item No. 34	Supply of material, erection, testing & commissioning of junction box with 2 cut out/MCB.
Explanation	This includes supply, erection, testing and commissioning of thermoplastic cable junction box Halogen free & weather proof for outdoor installations with metric knockouts for cable entry, IP65/66 Junction box size approx. 139x119x70 ($\pm 15\%$ of Size) with supply and fixing of 16 Amp. Two Nos. cutout/suitable and neutral link of 15mm X 3mm size. Junction boxes to be fixed on the pole/Covering shed or as per site with two Nos. clamps of suitable size. The size of junction box shall be selected according to items to be erected/fixed, proper space for required connections and heat dissipation. Make: - Rittal, Schneider, Hensel, GE Vynecker, Connectwell, BCH, Siemens, Precision, CAPE spelsberg, Safybox.
Item No.35	Supply and laying of 3 core, 2.5 sqmm, flexible PVC insulated multi core FRLS PVC sheathed multi stranded cables copper conductor for voltage grade up to 1100 v conforming to IS-694:2010.
Explanation	This item includes supply and laying of 3 core, 2.5 sqmm, flexible PVC insulated multi core FRLS PVC sheathed multi stranded cable copper conductor for voltage grade up to 1100 V confirming to IS 694-2010 or latest. Make: Polycab, Havells, Finolex, RR kabel and KEI.
Item No.36	Supply and laying of 3 core, 4 sqmm, flexible PVC insulated multi core FRLS PVC sheathed multi stranded cables copper conductor for voltage grade up to 1100 v conforming to IS-694:2010.
Explanation	This item includes supply and laying of 3 core, 4 sqmm, flexible PVC insulated multi core FRLS PVC sheathed multi stranded cable copper conductor for voltage grade up to 1100 V confirming to IS 694-2010 or latest. Make: Polycab, Havells, Finolex, RR kabel and KEI.
Item No.37	Supply and laying of 3 core, 6 sqmm, flexible PVC insulated multicore FRLS PVC sheathed multi stranded cables copper conductor for voltage grade up to 1100 v conforming to IS-694:2010.
Explanation	This item includes supply and laying of 3 core, 6 sqmm, flexible PVC insulated multi core FRLS PVC sheathed multi stranded cable copper conductor for voltage grade up to 1100 V confirming to IS 694-2010 or latest. Make: Polycab, Havells, Finolex, RR kabel and KEI.
Item No.38	Supply and laying of 4 core, 10 sqmm, flexible PVC insulated multicore FRLS PVC sheathed multi stranded cables copper conductor for voltage grade up to 1100 v conforming to IS-694:2010.
Explanation	This item includes supply and laying of 4 core, 10 sqmm, flexible PVC insulated multi core FRLS PVC sheathed multi stranded cable copper conductor for voltage grade up to 1100 V confirming to IS 694-2010 or latest. Make: Polycab, Havells, Finolex, RR kabel and KEI.
Item No.39, 40, 41,42,43,44, 45, and 46	Laying of 4core 400/300/240/185/120/70/25/16 sqmm UGAC with heat resisting insulation PVC Insulated and strip type Sheathed Armored Aluminum Conductor cable with 1x8SWG GI wire in existing trench/Pipe/ in air.
Explanation	This includes laying of 1100V grade, PVC insulated Armored aluminum Circular

	armored AL. PVC 1100 V grade Cable of size 4 CORE 400/300/240/185/120/70/25/16 sqmm with supplying & laying of 1 x 8 SWG GI mild wire, properly secured in pipe/ trench/ walls/ poles/ Platform shed/ trays etc. including connections at both ends along with suitable type and size lugs, bolts etc. At locations where cable is passed through pipes on walls / poles the same shall be secured with MS clamps of suitable size and hardware and proper size & type's glands shall be provided at the entrance of cable in panel junction box etc. The end of cable lead shall be properly lugged as per site requirement. The various sizes LT armored cables will be issued by Railway from the store depot of SSE-Stores (Power-GS) RTM free of cost, Necessary arrangements for loading and transportation of cables to site shall be made by contractor. (In One Trench single GI Wire for Earth Shall be acceptable). Supply & laying of 1x8swg GI mild wire shall be done by contractor.
Item No.47	Supply and laying of double walled corrugated DWC Pipes of size 120mm Outer dia &103mm inner dia.
Explanation	This includes Supply & Laying of HDPE double walled corrugated (DWC) pipes of minimum size 120mm Outer dia & 103mm inner dia as per IS-14930 or latest relevant and this item is also including coupler etc for joint two lengths of pipe. The length of HDPE DWC pipe shall be 6 meters with anti-rodent and fire-retardant properties.
Item No. 48	SUPPLY AND LAYING OF 65 MM DIA. DWC PIPE COMPLETE.
Explanation	This includes Supply & Laying of double walled corrugated (DWC) pipes of minimum size 65mm as per IS-16205 or latest suitable and this item is also including coupler etc. for joint two lengths of pipe.
Item No. 49	Design, manufacture, Erection and installation of display of wall / hanging /floor mounting type LED illuminated sign / direction boards in full elliptical / half elliptical / semi elliptical shape. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2 mm thickness. The text / graphics matter visibility shall be less than 160 deg. The approved colour text and graphics shall be printed / router cut on mono Meric 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 4-8 W/ sq. ft and with brightness more than ambient light. Suitable size end cap of 1.5mm thick SS 304 should be provided.

Explanation	<p>This item includes design, manufacturing, erection and installation of illuminated sign / direction boards as per the guideline issued by Railway Board (Attached separately) The main components of the item are highlighted below –</p> <p>General principles for design of signages</p> <p>Materials: The material for signages should be non- reflective, preferably matt finish to reduce the stray light reflectance and increase the visibility. The surface should be processed to prevent glare. Backlighting is preferred. The material of all signage boards shall be chosen to reduce wear and tear and possible damage by vandalism and at the same time easy to maintain. Some suggested materials for signage include Aluminium Composite Panel (ACP), acrylic, Concrete, Steel, wood etc.</p> <p>Typography, Colours and Pictograms: The typography shall be so selected that it provides context more easily understandable and can be read from adequate distance. The spacing of letterforms and vertical spacing between lines of text also have an impact on legibility of signages. For people with vision impairments, letters and lines of text can seem blurred when spaced too close together. A balance shall be sought between spacing text to be universally accessible.</p> <p>Some people may have difficulty distinguishing between different colours, if they appear next to each other. For this reason, a minimum luminance contrast of 30% is required to easily distinguish text on a background of different colour. However, a Visual Contrast value of 70 % is recommended. Visual Contrast value is the difference in Light Reflectance Value (LRV) between the Background Colour and Character Colour. LRV is measured on a scale of 0 to 100 where 0 equals black where total light is absorbed and 100 equals white where total light is reflected. If A1 is LRV of the lighter area colour and A2 is the LRV of the darker area colour, then Visual contrast value is calculated as $[(A1-A2)/A1] \times 100 \%$.</p> <p>Pictograms should be used to the maximum extent possible. Pictograms are useful because they are a form of shorthand for explaining directional or location messages, designed to be suitable for local as well as an international audience. Stand-alone pictograms are used to identify passenger facilities such as information points and toilets. See Annexure B for the list of standard icons. If a representative icon is not available in the list, then the same shall be approved by the DRM/PHOD concerned.</p> <p>Illumination: Signage shall preferably be internally illuminated when provided in Station Building and Platform areas. Wherever, non-illuminated boards are provided, sufficient illumination shall be ensured with the help of external lighting. Signage shall be illuminated wherever required from back using Single/Multiple LED Modules each with IP 65 protection of white colour and rating of appropriate watts. Modules should be uniformly placed in a manner that at least one LED Module every 12 - 16 sq. inch of surface required illumination. Each signage should have an individual power supply adaptor for illumination of all LED installed in signage. The power supply adaptor should be placed inside signage and power supply adaptor should be connected using a plugin type connector connected to mains supply. LED to be used with five-year replacement</p>
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warranty and specifications of LED module and Driver should be as per table below:

Module: LED Module Technical Specifications

Parameter	Module
Module Wattage(W)	≥1 W
Color Temp (K)	6500K
LED module makes	OSRAM/ GE CURRENT/ LUCO LED/ SLOAN/ NICHIA / LUMILED/ SAMSUNG
Chip	OSRAM/ CREE/ NICHIA/ LUMILED/ SAMSUNG
Module Lumen/Watt	≥150 lm/W
IP Rating	IP66
Beam Angle	≥160
SDCM (colour consistency, binning)	≤/ < 3.0
CRI	>80
Burning Hrs	50K @Tc Max (L70 B50)
LM79/ERP Report (Energy Related Product)	Yes
LM80 Certificate	YES
BIS Certificate	IS 10322 (Part5/Sec7)- IEC 60598-2-20
CE/RoHS	Yes
Operating Voltage	12/24V
Operating Temp	-25 to +70 Degree Celsius

LED Driver: LED Driver Technical Specifications

Parameter	Value
Power Factor	0.95
Input Voltage Range	180V - 270V
THD	<5%
IP Rating	IP67
Line to Earth Surge Protection	6 KV
Line to Neutral Surge Protection	4KV
Efficiency	90%
Expected Lifetime	50K Hrs
CE/ENEC/CB	Yes
BIS Certificate	IS15885
Protections	Yes

To promote energy efficiency, the lux levels of the illuminated signage boards except emergency signages should be reduced to 50% in selected time slots when the ambient light is still available, or when the passengers/ users are below 20% of the average peak hour traffic at the station. Use of Technology to remotely access and control shall be promoted.

Technical Specifications

- **Materials:** The material for signages recommended above shall be non-reflective matt finish. The surface shall be processed to prevent glare. Some suggested materials for signage include Aluminium Composite Panel (ACP), acrylic, Concrete, Steel, wood etc. The frame of the sign boards should be sturdy and corrosion resistant. The material for fabrication of the frame box should preferably be powder coated aluminium sheet or fibreglass. The signages meant to be installed without any shelter or roof above should be designed as to prevent entry of water inside, even under heavy rains. Weatherproof polymer lining should be used. The general technical specifications of the material which are for guidance only and are not mandatory of the material for different type of signage boards are outlined below:
- **Elliptical Illuminated Boards:** All the elliptical signage shall be illuminated. The display sheet shall be of unbreakable translucent polycarbonate sheet of 2mm to 3mm thickness. The approved colour text and graphics shall be printed / router cut on monomeric calendered vinyl of 100 µm thickness and shall be firmly pasted on display sheets. The text / graphics matter visibility shall not be less than 160 deg. The Top Profile of Elliptical Board shall preferably be made up of Aluminium Alloy (6063- T6) Extruded profile anodised to 15 µm +/- 3 µm. The profile nominal wall thickness shall be 2 mm. The reflective metallic silver PU particle coated granules shall be provided on the internal face of the profile. The edges of the profile shall be rounded. The profile shall have a suitable slot at an angle of 80-84 degree to firmly hold the polycarbonate sheet to its required shape. Bottom, top and side Profile shall be made of the same material having 2mm to 5mm wall thickness. The frame of elliptical boards shall preferably be made of Extruded Anodised hollow aluminium profile of size not less than 1.2 mm thickness and anodized to minimum 15µm thickness (Grade AC-15) in approved colour. Anodizing coating shall be as per IS: 1868 or latest amendment.
- **Aluminium Composite Panel (ACP) Boards:** Board material Aluminium Composite Panel of 4mm total thickness sheet with 0.5mm thick aluminium foil skin on both sides along with minimum 25-micron PVDF coating on top coil and polymer/epoxy coating on Back Coil of 4 to 7 microns. The sheet shall be fixed on aluminium substructure of required size fixed with stainless steel fastenings system and making 25mm grooves and applying non staining and non-streaking sealant with Baker rod. ACP boards can be used with either Vinyl Sheet or Retro reflective sheet.
- **Aluminium Sheets:** Aluminium sheets used for sign boards shall be of

smooth, hard and corrosion resistant aluminium alloy confirming to IS 736 material designation 24345 or 1900. The sheets shall be used with digitally printed reflective vinyl graphic.

- **Adhesives:** Two types of adhesives can be used to paste the base sheeting with top surface sheet. Pressure sensitive adhesive of the aggressive tack type requires no heat, solvent or other preparation for adhesion to a smooth clean surface. Tack free adhesive activated by heat requires heat for making a durable bond between materials. The heat is generally applied in a heat vacuum applicator. The adhesive thus formed shall have a durable bond to smooth, corrosion and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting from the sign base material in one piece by use of sharp instrument. The surface preparation and application process shall be in accordance with the manufacturer's specifications.
- **Fabrication:** The base material shall be first removed of any grease, oil, scale/dust or any other contaminants with the help of either acid or hot alkaline to obtain a smooth plain surface before the application of top surface sheet. If the base material surface is rough, approved surface primer shall be used. After cleaning, the materials shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of top surface material. Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure sensitive adhesives shall be overlapped not less than 5 mm. Sheeting with heat activated adhesives may be splices with an overlap not less than 5 mm or butted with a gap not exceeding 0.75 mm. The material shall cover the sign surface evenly and shall be free from twists, cracks, and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.
- **Text, Pictograms and Arrows:** The information on the sign boards shall either be screen printed or of cut outs. Screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. Cut-outs shall be of materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer.

Technical Specification for Elliptical / Parabolic Signage Boards

- Display Board shall be Full Elliptical (FE) / Half Elliptical (HE) / Semi Elliptical (SE). All the elliptical signage shall be illuminated. 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

	<p>per site requirement. The signage shall have the integral mounting arrangements with sturdy structural frame and ACP cladding on the back side of the signage to avoid rusting and entry of dust. The LED board shall have uniform illumination with 4- 8 W / sq. ft and with brightness more than ambient light. Suitable size end cap of 1.5 mm thick SS 304 should be provided.</p> <ul style="list-style-type: none"> ➤ Elliptical Glow Board Frame - The frame shall be made of Extruded Anodised hollow aluminium profile of size not less than 1.2 mm thickness and anodized to minimum 15µm thickness (Grade AC-15) in approved colour. Anodizing coating shall be as per IS: 1868 or latest amendment. ➤ Top Profile - Top Profile of Elliptical Glow Board shall be made up of Aluminium Alloy (6063-T6) Extruded profile anodised to 15 µm +/- 3 µm. The profile nominal wall thickness shall be 2 mm and width approx. 170 mm/ 137 mm/ 268 mm. The reflective metallic silver PU particle coated granules shall be provided on the internal face of the profile. The edges of the profile shall be rounded. The profile shall have a slot of approx. 4.8 mm & 7mm width on both sides to hold 2/3/4 mm thick polycarbonate sheet. The slot shall be at an angle of 80-84 degree to face firmly hold the polycarbonate sheet in elliptical and parabolic curvature. The Elliptical / Parabolic curvature of the polycarbonate sheet shall be maintained by its inherent flexural tension property. It should have circular slots for M6 self-tapping cheese head screws to fix the end caps. Along the centre line of the top of this profile there shall be a 10mm x 3mm slot for press fitting the heat sink holding brackets in place with circular slot for M6 self-tapping screw should be made available. There shall also be a flat extension of 12mm to rectangular slot for additional support/fixing screws to firmly hold the heat sink holding bracket. The Total height of the central projection should be maintained to minimize obstruction to light illumination. ➤ Bottom, Top and Side Profile - Bottom, top and side Profile full/ half of the Elliptical Glow Board shall be made of extruded anodized Aluminium Alloy hollow profile (6063-T6) having 2mm to 5mm wall thickness. It should have internal ribs with approx. 1.5mm/ 2.5mm thickness and 4.5mm, 4.2mm wide slot to firmly hold the polycarbonate sheet in elliptical and parabolic curvature using its flexural tension. Total external width & Height of the bottom, top & side profile should be full of approx. 34mm x 48mm R 11.7mm / 42mm x 50mm, R 24.3mm / 42mm x 80mm, R16mm / 84mm x 80 mm, R16mm without compromising the strength and causing any obstruction to the light while giving maximum viewing area. The bottom corner shall have a curvature of approx. R11.7mm, 24.3mm and 16mm to appear in continuous flow of elliptical Curvature of polycarbonate sheet. This also shall add to aesthetic beauty of the whole Elliptical Glow Board. ➤ Heat Sink Holding Bracket - Heat Sink Holding Bracket shall be of approx. length 184mm/ 252mm/ 260mm/ 324mm/ 397mm/ 537mm/ 551mm injection moulded in Nylon 6 material & 1130mm/1156mm/861mm in MS machine formed powder coated for its strength & flexibility. The bracket shall be of 'I' cross section of sizes approx. 102mm x 15mm x 10mm/1080mm x 25mm x 5mm/ 1156mm x 50mm x 5mm/861mm x 50mm x 5mm at mid portion and it should reduce proportionately in slant at both
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the ends for nylon 6mm, MS 5mm. thickness without obstructing the light and without compromising on strength. The 'I' cross section nylon shall have ribs for maintaining stiffness. Both the ends of HSH brackets shall have locking clasp to press fit in 10 mm x 3mm slot of top and bottom profile. The mid portion shall have offset of 14mm for nylon and 12 mm for MS. Central clasp shall be moulded in the Heat Sink Holding bracket to firmly hold the Heat Sink along the longitudinal axis of Elliptical Glow Board. The central clasp shall have two prong sets to hold the heat sink across its diagonal or along its sides as required. Two holes as per requirement shall be provided near the end clasps firmly. Two holes for nylon & MS shall be provided on both sides of central clasp to fix at both profiles Two holes shall be provided on both sides of central clasp to fix the mid portion of bracket to strip in the event longer bracket if required the mid portion of HSH bracket approx. 3 mm thick x 10 mm wide Aluminium strip in the event longer bracket is required or more than one Heat Sink is required for bigger size of Elliptical Glow Board.

- **Heat Sink** - Heat Sink shall be 25-26 mm hollow anodized Aluminium Alloy (6063-T6) profile of 2mm thickness. Corners shall be flattened to form a square across flat to hold the heat sink diagonally. Heat sink must be press fit horizontally and diagonally from all 8 sides. All the four sides shall have dovetail of slots. Circular slots of dia. 2 mm shall be provided at all four internal corners to tight fit the pins of Heat Sink connector. There shall be a set of three of approx. 1.5mm thick ribs central of approx. 5mm height and two sides of approx. 2mm height. Provision for maximize the surface area to aid in faster cooling as well as for additional strength to hollow square profile.
- **Heat Sink Connector** - Heat Sink connector shall be a moulded from polycarbonate profile of same cross-sectional dimensions as that of Heat Sink. The thickness of the connector shall be approx. 5 mm. Two semicircular slots shall be provided on each face. Provision to pass out hot air from heat sink should be made. Four pins shall be moulded on four corners on both the faces of Heat Sink connectors to be press fitted in Heat Sink profile.
- **Elliptical Glow Board End Cap** - End caps full / half with elliptical and parabolic shape shall be made from injection moulded polycarbonate granules 2 mm thick / SS 304 1.2 mm thick / Aluminium die casted 8 mm thick having curve on top side and internal hollow and elliptical base at bottom side with reflective internal surface. The End caps shall be perfectly opaque. The boards shall be such that the text & Graphics displayed on the Polycarbonate sheet held in these end caps should be completely visible even if it is viewed directly from the bottom or any direction; the text is very much legible. Polycarbonate cap Internal face shall be cross ribbed 2mm x 3mm to increase the strength of the end cap. Eight nos. locating pins tapering towards collar of the end cap shall be provided near the internal periphery of the end cap. These pins shall firmly hold the 3mm translucent polycarbonate sheet in elliptical / parabolic curvature. Circular cut-out of dia. approx. 80mm shall be provided for illuminated branding or opaque cap shall be provided in case of none branding. For branding

translucent material fitting provision should provide without shadow on branding. 2mm x 5mm Ribs approx. 20mm inside and parallel to the external periphery shall be provided for additional strength. Riser buttons shall be provided along the internal ribs to block the cut-outs using opaque sheet screwed through these buttons. These buttons may also be used to mount the LED projector when required. Projector fitting bracket shall be fixed to end cap to align with oval slot. Three nos. cap holding sockets shall be moulded at three corners of the End Cap. Two nos. locating pins shall be provided on each cap holding sockets and shall be provided at the bottom of these pins for additional strength. This pin shall locate in the top and bottom Aluminium profile. Two tapering ribs shall be provided to cap holding brackets for additional strength. Three through slots of approx. 17 mm x 1.5 mm shall be provided near the top of end cap for heat ventilation. Moulded Screw caps shall be provided to externally press fit in the cap holding sockets. The end cap shall be Moulded Shatter proof opaque polycarbonate as per IS 14443 or latest amended with thickness not less than 1mm and of reputed Indian make using Bayer granules. SS 304 elliptical or parabolic cap should have approx. 20 mm vertical collar at corners of suitable dia. hole to interlock with profile and structure, square bracket at bottom cap should be provided to interlock vertical square structure pipe and top cap should have cut out to thorough pass the structure pipe with the provision of ventilation. Aluminium die Casted cap top should have curvature of R 1123-1125 mm and internal hollow with wall thickness of 6-8mm with polished and premiered with metallic PU gloss lacquer coated. internal 2 nos. cap holding socket shall be casted at both corners of cap to interlock with side profile, Bottom casted cap should have side curvature of - R78-79mm / 112-113 mm and hollow of approx. 100 mm with internal 2 nos. cap holding socket shall be casted at both the corners of cap to interlock with side profile. Vertical rib should provide to interlock polycarbonate sheet with inner pins support should be flushed with side Aluminium profile. Cap should have a hole with die moulded dia. approx. 12 mm grommet to pass main supply wire.

- **Podium** - Elliptical shape one piece cut, top & bottom 3mm thick with size approx. 1170 mm x 512 mm x 508 mm at R914mm at corner R 117mm / 1643 mm x 575 mm x 508 mm at R 1652mm at corner R 92.5mm of SS 304 with parabolic shape cut at centre having dia. approx. 8 mm, 2 hole on top for matching with bottom cap of Elliptical Glow Board for fixing and interlocking without welding and bottom approx. 12 mm 4 hole for foundation fitting should be provided. Provide approx. 4 mm 9 holes for ventilation at top and Backside open able door system with lock & key. SS 304 grade frame structure of size approx. 25mm x 50mm x 1.2mm square with vertical and horizontal supports covered with SS 304 sheet of 1.2mm thick with powder coated in elliptical shape machine formed matching with top of podium should provide Anchor fastener fitting provision has to be made for ground fixing.
- **ACP Cladding** - Design, fabrication & installation of 3mm thick exterior grade PVDF coated Aluminium composite panels (Timex, Alucobond) of having 0.5 mm thick Aluminium PVDF coated sheet with specific standard

	<p>colour + 3 mm core material + 0.5 mm Aluminium sheet chemically treated (back sheet) bent with 5mm uniform machine grooved as per requirement, fitted on anodised Aluminium/ anodized Aluminium angle Primer with PU coated MS rectangular grid work. Grid for supporting ACP shall be of size approx. 38mm x 38mm x 1.5mm at a distance of Heat sink fixed in Elliptical Glow Board should accurately match Horizontally & Vertically along with existing structure on site. Hardware, fixtures, brackets, anchor, fasteners of SS 304 grade etc. complete duly sealed with weathering silicon (DOW / GE) for circular columns and curved beams etc. Provision of MS clamp/ bracket for fixing with existing structure vertically, horizontally or slanted without welding and with level size alignment adjustment and interlocking provision without compromising strength and structural stability of frame should provide.</p> <ul style="list-style-type: none"> ➤ The hanging/ fixing arrangement shall be design by the MS Strip/ channel of minimum size 50x5 mm / 50x50x5 mm and any required items according to location where signage board's will be installed. ➤ Text/Graphics - Text/Graphics shall be computer cut/printed on 100 µm Monomeric calendared Vinyl matt sheet of reputed make (Metamark / 3M) ➤ Led Ribbon Light Illumination - Ribbon light shall be of waterproof SMD 2835. The width of Ribbon light shall be 12 +/- 1mm. This shall be slide into the dovetail grooves of the heat sink & firmly pasted on all four sides of the heat sink. The light emitted from LED ribbon light should be partially reflected from the elliptical and parabolic curvature of white glossy polycarbonate sheet multiple times. Any obstruction or low brightness at the edges of the beam should be taken care of. Uniform illumination Average 4W-8W/ Sq.ft. ➤ Sign Substrate - Sign substrate shall be of Eco Friendly, High impact strength, shatter proof, UV resistant, Translucent, non-flammable White polycarbonate solid sheet as per IS 14448 of not less than 3mm of reputed make Bayer / Lexan / Polymac. Light transmission shall be in the range of 60% - 90%. Provide U shaped 7mm x 1mm / 4mm x 1mm / 8 mm x 2mm gasket for tight holding and interlocking polycarbonate sheet in aluminium profile. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note:</p> <ul style="list-style-type: none"> ➤ The successful contractor shall arrange of all equipment, tools, consumables, testing meters, Hydra scaffolding, crane, forklift etc. and other required materials for successful completion of the work. ➤ Any work not specifically mentioned, but required for successful completion of work is deemed to be included in the work. If any activity required to be included later on due to reliability and safety shall be carried out by contractor without any extra cost. ➤ Only important details of signage guideline (issued by Railway board) mentioned above. For execution, refer signage guideline issued by Ministry of Railways (attached separately) for complete details & standards. ➤ Warranty shall be applicable as per guideline issued by </div>
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		Ministry of Railways	
Item No.50	Supply, installation, testing & commissioning of LED base name board of Railway station in English with power LED's, Driver and wiring of board as per specification given IN ENGLISH		
Explanation	<p>The includes supply of material, design, manufacture, erection, testing & commissioning of LED based name Boards for station in English of UJJAIN / LAXMIBAI NAGAR / NAIKHEDI STATION and as per specification below. LED circuit provided with 12/24 V LED driver of suitable make and capacity.</p> <p>Acrylic letters along with LED will be fixed on 3mm thick aluminum composite panel sheet of suitable size height and entire sheet shall be supported on suitable size of MS angle frame from the back side to withstand wind pressure. The entire frame will be supported on suitable size of MS angle frame (properly painted by black/white colour with base of red oxide) from the back side to withstand wind pressure. The successful tenderer shall submit a detailed drawing of the boards for approval of Sr.DEE/P//RTM before manufacturing.</p> <p>a) High Glow LED Letters: letter height in English 2.0 feet (24 inch), for width of letter should be proportionate to the height & thickness 3" made with acrylic Sheet of thickness 3mm minimum.</p> <p>b) SMPS based power supply of capacity 12V/ 20A to work directly on 90 to 270 V, 50 Hz, Single phase AC Supply.</p> <p>c) Mounting arrangement with M.S. Angle Size 50X50X5mm or 40X40X3mm for above equipment's as per site requirement.</p> <p>d) L.E.D : Water proof LED module with 3 Nos. of SMD LED in Red Colour</p> <p>e) Back of letter should be of 28 SWG powder coated sheet.</p> <p>f) Front & back should be assembled in such a fashion that it remains water tight dust proof.</p> <p>g) Front & back of letters should be jointed/tighten with steel screw and washers, so that it may be opened in case of failure or for maintenance.</p> <p>h) All letters of each location should be fitted suitably on 3mm thick ALUMINUM PANEL Sheet. if required this sheet to be fixed suitably on above structure.</p> <p>i) Complete name board should be fixed on a M.S. Iron frame structure suitable size to withstand the atmospheric whether wind pressure.</p> <p>j) M.S. Structure should be grouted well with appropriated cement concrete mixture at given location.</p> <p>Make of Acrylic sheet: - Perspex from Lucite, SHINKOLITE PX cast acrylic sheet developed by Mitsubishi Rayon Co., Ltd., Plexiglas from Evonik industries, Astari, MG, EP, Plastech, JMD, EP Premium.</p>		

1.0 Specifications:

Sl No.	Parameter	Description
1	No. of LEDs	As per requirements
2	Frame Type	Square MS pipe of 18 SWG thickness of 19 mm size and front cover of 3 mm thick ACP sheet.
3	Physical dimensions for acrylic sheet	As per the letter requirement
4	Thickness of acrylic sheet	3.00 mm
5	Language	ENGLISH
6	Wattage per letter	6 Watts to 22 watts (approx.), LED Wattage = 0.2 Watt/LED or as per module, Spacing between adjacent LED modules must not be more than 40 mm.
7	LED Control	Current Regulator
8	Viewing Angle	120 Deg
9	Nominal Voltage	230 V AC
10	Operating Voltage	150 V to 260 V AC, 50 Hz
11	Maximum viewing Distance	Not less than 200m
12	Height of letter	2.0 feet (24 inch)
13	Letters Colour	ENGLISH - RED
14	Approved source of LED	NICHIA/CREE/ OSRAM/ SEOUL/ PHILIPS LUMILEDS /SAMSUNG.

2.0 Operating Conditions:

The equipment shall be sturdy and suitable for the following service conditions to be normally met in service:

Ambient Temperature -5° C to +55°C

Humidity Relative humidity: 40% to 100%

Altitude Max 1200 meters above sea level

Atmosphere Extremely dusty and desert weather and desert terrain in certain area.

The dust content in air may be as high as 1.6mg/m³. During dry weather, the atmosphere is likely to be full of dirt and dust. The equipment shall be designed to work in corrosive

atmosphere. In industrial areas, there may be airborne contaminants like smoke and chemical vapors and conducting particles.

3.0 Specification of LED for fitted with fire resistance silicon base board:

3.1 Colour SMD LED Module of uniform intensity and luminosity shall be used for excellent visibility. The intensity of the illumination shall be such that it should be possible to read the letters clearly from a distance of Approx 200 meters or more.

3.2. All system units should be modular, such that any module (i.e. LED modules,

	<p>connector, cable, power supply unit, etc) can be easily removed when defective and a fresh module can be fixed to make the system functional again.</p> <p>4.0 Power Supply Unit:</p> <p>4.1 All power supply units supplied shall be switch mode power supply (SMPS) type Operated from AC source in the voltage range 90-270 V AC, 50 HZ AC and single phase.</p> <p>4.2 Over voltage and short circuit protection is incorporated within the power supply.</p> <p>Summery details of power supply:</p> <p>Power supply Switched Mode Power Supply Rated Working Voltage 230V AC, 50Hz Working voltage range 90V – 270 V AC Output 12V/20A DC Power Factor > 0.95</p> <p>5.0 General Requirements:</p> <p>6.1 The unit shall be suitable for mounting/hanging and shall be specially designed for protection against dust specification.</p> <p>6.2 The unit should be compact and robust.</p> <p>6.3 The unit should have protected against open circuit & short circuit for the cables and circuits used. The design shall be modular, so that only the defective part need be replaced.</p>
Item No.51	<p>Supply, installation, testing &commissioning of LED base name board of Railway station in Hindi with power LED"s,Driver and wiring of board As per specification given IN HINDI -</p>
Explanation	<p>The includes supply of material, design, manufacture, erection, testing & commissioning of LED based name Boards for station in HINDI of UJJAIN / LAXMIBAI NAGAR / NAIKHEDI STATION (in Hindi) and as per specification given below. LED circuit provided with 12/24 V LED driver of suitable make and capacity.</p> <p>Acrylic letters along with LED will be fixed on 3mm thick aluminum composite panel sheet of suitable size height and entire sheet shall be supported on suitable size of MS angle frame from the back side to withstand wind pressure. The entire frame will be supported on suitable size of MS angle frame (properly painted by black/white colour with base of red oxide) from the back side to withstand wind pressure. The successful tenderer shall submit a detailed drawing of the boards for approval of Sr. DEE/P//RTM before manufacturing.</p> <p>a) High Glow LED Letters: letter height in Hindi 2.0 feet (24 inch), for width of letter should be proportionate to the height & thickness 3" made with acrylic Sheet of thickness 3mm minimum.</p> <p>b) SMPS based power supply of capacity 12V/ 20A to work directly on 90 to 270 V, 50 Hz, Single phase AC Supply.</p> <p>c) Mounting arrangement with M.S. Angle Size 50X50X5mm or 40X40X3mm for above equipment's as per site requirement.</p> <p>d) L.E.D : Water proof LED module with 3 Nos. of SMD LED in Red Colour</p> <p>e) Back of letter should be of 28 SWG powder coated sheet.</p> <p>f) Front & back should be assembled in such a fashion that it remains water tight</p>

dust proof.

g) Front & back of letters should be jointed/tighten with steel screw and washers, so that it may be opened in case of failure or for maintenance.

h) All letters of each location should be fitted suitably on 3mm thick ALUMINUM PANEL Sheet. if required this sheet to be fixed suitably on above structure.

i) Complete name board should be fixed on a M.S. Iron frame structure suitable size to withstand the atmospheric whether wind pressure.

j) M.S. Structure should be grouted well with appropriated cement concrete mixture at given location.

Make of Acrylic sheet: - Perspex from Lucite, SHINKOLITE PX cast acrylic sheet developed by Mitsubishi Rayon Co., Ltd., Plexiglas from Evonik industries, Astari, MG, EP, Plastech, JMD, and EP Premium.

2.0 Specifications:

Sl No.	Parameter	Description
1	No. of LEDs	As per requirements
2	Frame Type	Square MS pipe of 18 SWG thickness of 19 mm size and front cover of 3 mm thick ACP sheet.
3	Physical dimensions for acrylic sheet	As per the letter requirement
4	Thickness of acrylic sheet	3.00 mm
5	Language	ENGLISH
6	Wattage per letter	6 Watts to 22 watts (approx.), LED Wattage = 0.2 Watt/LED or as per module, Spacing between adjacent LED modules must not be more than 40 mm.
7	LED Control	Current Regulator
8	Viewing Angle	120 Deg
9	Nominal Voltage	230 V AC
10	Operating Voltage	150 V to 260 V AC, 50 Hz
11	Maximum viewing Distance	Not less than 200m
12	Height of letter	2.0 feet (24 inch)
13	Letters Colour	HINDI - RED
14	Approved source of LED	NICHIA/CREE/ OSRAM/ SEOUL/ PHILIPS LUMILEDS /SAMSUNG.

2.0 Operating Conditions:

The equipment shall be sturdy and suitable for the following service conditions to be normally met in service:

Ambient Temperature -5° C to +55°C

Humidity Relative humidity: 40% to 100%

	<p>Altitude Max 1200 meters above sea level Atmosphere Extremely dusty and desert weather and desert terrain in certain area. The dust content in air may be as high as 1.6mg/m³. During dry weather, the atmosphere is likely to be full of dirt and dust. The equipment shall be designed to work in corrosive Atmosphere. In industrial areas, there may be airborne contaminants like smoke and chemical vapors and conducting particles.</p> <p>3.0 Specification of LED for fitted with fire resistance silicon base board: 3.1 Colour SMD LED Module of uniform intensity and luminosity shall be used for excellent visibility. The intensity of the illumination shall be such that it should be possible to read the letters clearly from a distance of Approx 200 meters or more. 3.2. All system units should be modular, such that any module (i.e. LED modules, connector, cable, power supply unit, etc) can be easily removed when defective and a fresh module can be fixed to make the system functional again.</p> <p>4.0 Power Supply Unit: 4.1 All power supply units supplied shall be switch mode power supply (SMPS) type Operated from AC source in the voltage range 90-270 V AC, 50 HZ AC and single phase. 4.2 Over voltage and short circuit protection is incorporated within the power supply.</p> <p>Summery details of power supply: Power supply Switched Mode Power Supply Rated Working Voltage 230V AC, 50Hz Working voltage range 90V – 270 V AC Output 12V/20A DC Power Factor > 0.95</p> <p>5.0 General Requirements: 6.1 The unit shall be suitable for mounting/hanging and shall be specially designed for protection against dust specification. 6.2 The unit should be compact and robust. 6.3 The unit should have protected against open circuit & short circuit for the cables and circuits used. The design shall be modular, so that only the defective part need be replaced.</p>
Item No.52	Supply, installation, testing & commissioning of LED base Glow sign logo of western Railway & Indian Railway
Explanation	<p>This includes supply of supply, fixing, testing & commissioning of LED base Glow sign Logo of Indian Railway & Western Railway of LED backlit Single sided boards made by 0.8mm CRCA powder coated sheet with vinyl past on acrylic sheet which is backlit with 3-Diode LED Module, inbuilt SMPS Driver, including fabrication and should be fixed on a M.S. Iron frame structure suitable size to withstand the atmospheric weather wind pressure etc. M.S. Structure should be grouted well with appropriated cement, concrete mixture at given Location. The LED base Glow sign Logo of Indian Railway & Western Railway shall be of 5 feet x 7 feet x 1 feet size and well supported and the structure should be prepared to bear wind pressure and also self-weight. The Acrylic sheet shall be fixed between duly fabricated square section and from the top it should be supported by S.S angle of size approx. 25mm x 25mm and will be fixed by screw. The board should be illuminated from inside by providing with LED Water proof 3-Diode</p>

	<p>Module make NICHIA/CREE/OSRAM/SEOUL/PHILIPSLUMILEDS/LEDNIUM/AVAGO/SAMSUNG with internal wiring etc. The board shall be designed to provide uniform brightness & readable from a distance of 15 meters.</p> <p>The Board shall be provided with internal wiring by PVC copper cable of suitable size and shall have provision of PVC/Rubber Grommet for further connection. Provision shall also be made for 01 earth terminal & suitable no's of louvers on both sides for proper heat dissipation. The matter, size of letter, language & colour code of signage board to be digitally printed vinyl pasting shall be given by the concerned Field Supervisor.</p> <p>The LED base Glow sign Logo of Indian Railway & Western Railway shall be of 5 feet x 7 feet x1 feet size. The board shall be fixed on a M.S. Iron frame structure suitable size to withstand the atmospheric weather wind pressure etc. M.S. Structure should be grouted well with appropriated cement, concrete mixture at given Location and connection to be given by a 3 core PVC insulated copper flexible cable of 24/0.20 mm size through a PVC flexible pipe from the existing ceiling rose point. The matter and colour will be as decided by Railway authorities as per actual site requirement.</p> <p>The matter, size of letter, language & colour code of Logo of Indian Railway & Western Railway shall be given by the concerned Field Supervisor.</p> <div data-bbox="363 762 883 1327" data-label="Image"> </div>
Item No. 53	<p>Supply, erection, testing & commissioning of On-Line UPS 2 KVA with isolation transformer suitable for single phase AC input and single-phase output, floor mounted type Back up time -120 minutes.</p>
Explanation	<p>This includes supply, erection, testing and commissioning of On-line UPS -2KVA Capacity single phase AC Supply.</p> <p>GENERAL REQUIREMENTS</p> <p>The UPS system shall be an integrated system comprising of input rectifier, high frequency based PWM technique inverter using IGBTs and DSP/Microprocessor/Microcontroller based control electronics, static by pass switch and manual bypass switch. The battery charger shall either be integral part of rectifier or a separate module. The charger shall be designed such that it shall be able charge the battery in constant voltage, constant current mode. Charging capacity shall be at the rate of 0.1C (C is the AH capacity of the battery). The charger shall be capable to recharge the battery from discharged condition to its full capacity in 8 to 10 hrs.</p>

The UPS system shall be suitable to feed all loads connected to output which are primarily computers, printers, servers, scanners, modems etc.

The UPS system shall be in-built isolation transformer (copper wound) and shall be based on latest generation technology having proven performance of satisfactory operation for similar applications. The inverter, rectifier and battery charger shall be IGBT based systems with IGBT modules only. All components shall be of quality and reliability that satisfies the requirements of a secure AC power to vital equipment. Components shall be capable of withstanding the thermal and dynamic stresses resulting from internal and external short circuits and circuit switching operations etc. The design of the UPS shall be such as to withstand short circuit at load without causing an adverse effect on the UPS. The UPS system shall be of 2KVA rating with single phase input and single-phase output.

UPS design & performance requirements

Incoming AC supplies shall be converted to DC through input rectifier. The rectifier/charger shall operate according to the constant voltage current limiting principle and shall incorporate a "Soft Start" feature to gradually accept load on initial energizing.

The rectifier section/battery charger of the UPS system shall be capable of precise regulation to prevent damage to the battery. The output voltage of rectifier's DC bus without the battery shall be stabilized to within 2% of set value during load variation between 0 to 100% of the rectifiers and specified mains input supply voltage variation. Current ripple content shall be less than 3% in the battery with battery connected.

UPS shall be designed to ensure that the harmonic component in the input currents are limited to less than applicable IEEE/IEC standards so as not to cause undue harmful effect on other sensitive equipment operating on the same supply bus. Suitable filters/harmonic traps shall be provided as required.

An R.F. filter shall be provided at the input and output of UPS to suppress the radio frequency interference to permissible limits as specified in IEC.

Transient/surge protection shall be provided in the input circuit to rectifiers to protect the UPS from surges & voltage spikes. Class C type SPD of appropriate rating with indication should be used where chances of lightning strikes are more or at those places where the chances of indirect surges in power supply are high. Otherwise, conventional surge protection with MOVs is to be done.

UPS shall be designed to operate satisfactorily while deriving power from an emergency diesel generating set. Suitable protection shall be provided in the control circuits to guard against electrical oscillations which may be present in the input supply as caused by emergency DG sets.

The UPS shall be provided with automatic sequence and power walk in circuit(s) with time delay up to 20 sec such that the rectifiers and inverters can start operating automatically when incoming AC power is restored allowing the UPS to be loaded automatically.

Make of UPS shall be **LUMINOUS / AXIS / MICROTUX /MICRO POWER/ UNILINE**

SMF/VRLA Batteries, having test reports of NABL approved laboratory of one of the following Make: -

Make - AMARA RAJA / AMRON/ EXIDE/ PANASONIC/HITACHI/YUASA shall be provided (2 Volt single cells or in the form of crate of 12V-42AH.

- a. Load Power Factor of 0.65 to unity
- b. Battery Current = Inverter rated VA X Power factor/ (Inverter efficiency X End cell voltage X No. of cells).
- c. Ageing factor of 0.8.
- d. Minimum end cell voltage for lead acid battery 1.75V per cell. Battery low pre-alarm to be set at 1.8 volts per cell.

The rectifiers/ chargers shall be designed to completely re-charge the battery in a maximum time of 10 hours after complete discharge. The rectifier/charger shall be sized based on the maximum inverter input load when inverter is delivering its rated output at 0.8 pf lagging and recharge the battery to nominal rated capacity of the battery.

The rectifiers/charger shall sense the battery charging current and adjust the DC bus voltage to maintain the charging current to pre-set level. A separate current limit circuit shall also be provided for adjustment of battery current. Subsequent to a discharge cycle when battery is connected to rectifier/charger, the battery current shall be monitored, controlled and limited to set value automatically irrespective of the inverter input current. The rectifier shall be protected against reverse battery connection at dc link voltage.

The rectifier/chargers shall be designed to completely charge the battery in a maximum time of 10 hours after complete discharge.

The steady state output voltage and frequency (free running) variation of inverters shall not exceed $\pm 1\%$ from the set value for specified input factor variation from 0.8 lag to 1.0.

The UPS output voltage waveform shall be sinusoidal. The test Harmonic distortion of voltage waveform at inverter output shall not exceed 3% of RMS value of the fundamental considering any linear load up to maximum rated output of UPS system at rated power factor and not exceeding 15% under non-linear load.

The UPS system shall be able to operate satisfactorily on rated loads (in kVA) with power factors in the range of 0.65 lag to 1.0. The overall efficiency of the UPS system shall not

be less than 85% at rated load at 0.8 pf and at nominal input voltage.

The UPS shall have capacity to deliver a minimum overload of 125% for 10 minutes and 150% for 60 sec. UPS shall be provided with current limit circuit to avoid excessive loading beyond its permissible overload withstands capability.

Unless otherwise specified, the voltage variation shall not exceed $\pm 5\%$ and complete recovery to normal steady state shall be within 40 ms. The above requirement shall be complied for following transient disturbances.

- a) 100% step load and unload (for hot standby only)

	<p>b) 50% step load.</p> <p>c) Momentary interruption in power supply.</p> <p>d) Load transfer to bypass supply.</p> <p>The battery may be taken out of service for maintenance during which period it shall be possible for the UPS to continue operation by drawing power from the rectifier. Ripple content of the charger output shall not exceed 3% with battery connected.</p> <p>All the thyristors, diodes, IGBTs and other electronic devices of UPS shall be given adequate protection from short circuits.</p> <p>All PCBs shall be provided with a transparent epoxy coating for environmental protection and tropicalisation. They shall be suitably located away from heat sources.</p> <p>A visual indication and audio alarm shall be provided for load on bypass mode. The visual indication and audio alarm are to be provided at the place where the operators of the system are available so as to alert them about the abnormality in the system.</p> <p>Battery Accessories: Batteries if provided outside the UPS, system shall be of double row double tier formation. The stand shall be made of standard L angle channel and duly spray painted with two coats of epoxy-based panel paint or powder coated.</p> <p>Technical Specifications Technology – IGBT based True On-line technology with high frequency PWM.</p>
Item No. 54	SITC of Online UPS of Rating 5.0 KVA With Battery of Backup Time 120 Minutes as per specification
Explanation	<p>This includes supply, erection, testing and commissioning of On-line UPS -5KVA Capacity single phase AC Supply.</p> <p>GENERAL REQUIREMENTS</p> <p>The UPS system shall be an integrated system comprising of input rectifier, high frequency based PWM technique inverter using IGBTs and DSP/Microprocessor/Microcontroller based control electronics, static by pass switch and manual bypass switch. The battery charger shall either be integral part of rectifier or a separate module. The charger shall be designed such that it shall be able charge the battery in constant voltage, constant current mode. Charging capacity shall be at the rate of 0.1C (C is the AH capacity of the battery). The charger shall be capable to recharge the battery from discharged condition to its full capacity in 8 to 10 hrs.</p> <p>The UPS system shall be suitable to feed all loads connected to output which are primarily computers, printers, servers, scanners, modems etc.</p> <p>The UPS system shall be in-built isolation transformer (copper wound) and shall be based on latest generation technology having proven performance of satisfactory operation for similar applications. The inverter, rectifier and battery charger shall be IGBT based systems with IGBT modules only. All components shall be of quality and reliability that satisfies the requirements of a secure AC power to vital equipment. Components shall be capable of withstanding the thermal and dynamic stresses resulting from internal and external short circuits and circuit switching operations etc. The design of the UPS shall be such as to</p>

withstand short circuit at load without causing an adverse effect on the UPS. The UPS system shall be of 5KVA rating with single phase input and single-phase output.

UPS design & performance requirements

Incoming AC supplies shall be converted to DC through input rectifier. The rectifier/charger shall operate according to the constant voltage current limiting principle and shall incorporate a "Soft Start" feature to gradually accept load on initial energizing.

The rectifier section/battery charger of the UPS system shall be capable of precise regulation to prevent damage to the battery. The output voltage of rectifier's DC bus without the battery shall be stabilized to within 2% of set value during load variation between 0 to 100% of the rectifiers and specified mains input supply voltage variation. Current ripple content shall be less than 3% in the battery with battery connected.

UPS shall be designed to ensure that the harmonic component in the input currents are limited to less than applicable IEEE/IEC standards so as not to cause undue harmful effect on other sensitive equipment operating on the same supply bus. Suitable filters/harmonic traps shall be provided as required.

An R.F. filter shall be provided at the input and output of UPS to suppress the radio frequency interference to permissible limits as specified in IEC.

Transient/surge protection shall be provided in the input circuit to rectifiers to protect the UPS from surges & voltage spikes. Class C type SPD of appropriate rating with indication should be used where chances of lightning strikes are more or at those places where the chances of indirect surges in power supply are high. Otherwise, conventional surge protection with MOVs is to be done.

UPS shall be designed to operate satisfactorily while deriving power from an emergency diesel generating set. Suitable protection shall be provided in the control circuits to guard against electrical oscillations which may be present in the input supply as caused by emergency DG sets.

The UPS shall be provided with automatic sequence and power walk in circuit(s) with time delay up to 20 sec such that the rectifiers and inverters can start operating automatically when incoming AC power is restored allowing the UPS to be loaded automatically.

Make of UPS shall be LUMINOUS / AXIS / MICROTUX /MICRO POWER/ UNILINE

SMF/VRLA Batteries, having test reports of NABL approved laboratory of one of the following Make: -

Make - AMARA RAJA / AMRON/ EXIDE/ PANASONIC/HITACHI/YUASA shall be provided

- e. Load Power Factor of 0.65 to unity
- f. Battery Current = Inverter rated VA X Power factor/ (Inverter efficiency X End cell voltage X No. of cells).
- g. Ageing factor of 0.8.
- h. Minimum end cell voltage for lead acid battery 1.75V per cell. Battery low

	<p>pre-alarm to be set at 1.8 volts per cell.</p> <p>The UPS shall be designed according to backup time of minimum 2 Hours.</p> <p>Battery Accessories: For stand the Batteries, adequate/ suitable size stand shall be made of standard L angle channel and duly spray painted with two coats of epoxy-based panel paint or powder coated.</p> <p>Technical Specifications Technology – IGBT based True On-line technology with high frequency PWM.</p>
Item No. 55	<p>Supply of Self drinking water cooler with (non-CFC refrigerant) energy efficient compressor, cooling capacity Ltrs/Hr.: 150, Type: Storage, Storage Capacity Ltrs.: 150, Rate of Max. energy consumption watt:1550. As per specification.</p>
Explanation	<p>Supply, erection, testing, and commissioning of self-contained storage type drinking water cooler complete in all respects, suitable for continuous operation.</p> <p>Technical Specifications</p> <ul style="list-style-type: none"> • Type: Self-contained, storage type • Refrigerant: R134a or latest • Cooling Capacity: 150 liters per hour • Storage Capacity: 150 liters • Tank Material: Stainless steel • Inlet Water Temperature: 30°C / 35°C • Power Supply: 230 V \pm5%, 50 Hz, Single Phase, AC • Standards: Conforming to IS: 1475 (latest revision) <p>Components & Features</p> <ul style="list-style-type: none"> • Sealed hermetic compressor • Overload protection • Thermostat and temperature control system • All standard safety and control accessories <p>Scope of Work</p> <ul style="list-style-type: none"> • Supply of complete drinking water cooler unit • Erection, installation, testing, and commissioning • Proper electrical connection including plug, socket, and connect to earthing. • Proper connection of inlet and outlet water pipelines • Supply of all materials, fittings, fasteners, and accessories required for complete installation <p>Civil Works</p> <ul style="list-style-type: none"> • Construction and/or repairing of CC / brick foundation of suitable size and strength, as per site requirements, wherever required <p>Completion</p> <ul style="list-style-type: none"> • The work shall be executed in a safe, workmanlike manner, fully operational, and to the satisfaction of the Engineer-in-Charge. <p>Make: Usha/Blue Star /Voltas /Sidwal /Mechelec.</p>
Item No. 56	<p>Supply and fixing of Evaporative Jumbo Air Coolers (Desert Coolers), Floor Mounted as per specification as per specification.</p>
Explanation	<p>This item includes supply and fixing of Evaporative jumbo air cooler (Desert cooler), floor mounted, 230-240Volts, 50 Hz, minimum air capacity – 8000 Cubic</p>

	meter per hour, Long Air Throw: to cover large areas easily, Tank capacity – 160 liter minimum, Plastic enclosure-fire retardant, Auto Louver Movement, filter pad-Thick Honey comb, Minimum 3 meter length 3 core power cable of ISI marked with top of suitable capacity, Durable Pump: Concealed submersible pump for long life and minimal maintenance, provision of 4-wheels of suitable capacity with locking arrangement and with provision of ON/Off switch, speed regulator, Pump On/Off switch, desert cooler shall be confirming to IS 3315 or suitable latest, Fan motor ISI marked to confirming IS 996 or suitable latest. Submit test reports of Central Government Lab/ NABL accredited LAB / ILAC accredited LAB before supply of material.																																				
Item No.57	Supply, fixing, testing and commissioning of on load manual change over with enclosure of cap. 200A as per specification																																				
Explanation	<p>This item included Supply, erection, testing and commissioning of Manual change over switch of 200 Amp rating, 4-pole (3-Phase+1Neutral), heavy duty construction having terminal shrouds and phase barriers, On load operation along with enclosure/ protective housing that shields the switch and its component from environmental factors such as dust, dirt, moisture etc., prevents access to live electrical parts, and organizes wiring powder coated, Enclosure shall be made from steel sheet, powder coated, IP as per standards, and have locking arrangement, earthing terminal, wall/panel mounted, sufficient space to connection/disconnection of cables</p> <p>The single rotary handle allows for three positions: Source 1 ON, OFF, and Source 2 ON.</p> <p>Technical details are as follows-</p> <table border="1"> <tr> <td>Rated current</td><td>200A</td></tr> <tr> <td>Reference standards</td><td>IS / IEC 60947-3, IEC 60947-3, IS/IEC 60947-6-1, IEC 60947-6-1</td></tr> <tr> <td>No. of Poles</td><td>4</td></tr> <tr> <td colspan="2">Electrical Characteristics</td></tr> <tr> <td>Rated Operational Voltage</td><td>415V AC</td></tr> <tr> <td>Rated Insulation Voltage</td><td>1000V</td></tr> <tr> <td>Rated Impulse Withstand Voltage</td><td>8KV</td></tr> <tr> <td>Rated Frequency</td><td>50Hz</td></tr> <tr> <td colspan="2">Rated Operational Current (Ie) according to IEC 60947-3</td></tr> <tr> <td>415 VAC, AC-21A/ AC-22A/ AC-23A</td><td>200A</td></tr> <tr> <td>Rated Breaking Capacity for AC-23A</td><td>1600A</td></tr> <tr> <td>Rated Making Capacity for AC-23A</td><td>2000A</td></tr> <tr> <td>Short-time withstand (Icw), 1 sec</td><td>7 kArms</td></tr> <tr> <td>Short-circuit making capacity, Icm</td><td>12 kApeak</td></tr> <tr> <td>Mechanical Endurance</td><td>16000</td></tr> <tr> <td>Electrical Endurance</td><td>2000</td></tr> <tr> <td>Rated short-circuit current at 415 V, 50 Hz / 60 Hz</td><td>50 Karms</td></tr> <tr> <td colspan="2">Termination</td></tr> </table>	Rated current	200A	Reference standards	IS / IEC 60947-3, IEC 60947-3, IS/IEC 60947-6-1, IEC 60947-6-1	No. of Poles	4	Electrical Characteristics		Rated Operational Voltage	415V AC	Rated Insulation Voltage	1000V	Rated Impulse Withstand Voltage	8KV	Rated Frequency	50Hz	Rated Operational Current (Ie) according to IEC 60947-3		415 VAC, AC-21A/ AC-22A/ AC-23A	200A	Rated Breaking Capacity for AC-23A	1600A	Rated Making Capacity for AC-23A	2000A	Short-time withstand (Icw), 1 sec	7 kArms	Short-circuit making capacity, Icm	12 kApeak	Mechanical Endurance	16000	Electrical Endurance	2000	Rated short-circuit current at 415 V, 50 Hz / 60 Hz	50 Karms	Termination	
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Termination																																					

	Max. Al. cable with lug	150 mmsq
	Max. link width	30 mm
	Max. link thickness	5 mm
	Termination tightening torque	10 Nm
	Make	Havells, ABB, L&T, C&S, Legrand, Siemens, schneider
Before supply, test reports and the TDS shall be submitted for approval.		
Item No. 58	Supply of material, erection, testing & commissioning of Auto change over switch 32 Amp As per specification.	
Explanation	<p>This includes supply, fixing, testing and commissioning of Automatic Change Over Switch 32 Amp Capacity, Single phase, weatherproof, outdoor type having canopy arrangement on top, front cover and to be fixed on wall with indication lamps. Cable shall be entered with suitable glands.</p> <p>Make: - Automatic Change Over Switch: - ASCO / ARISTO / HPL / HAVELLS / L&T / SIEMENS / ABB / CROMPTON / STANDARD/ BCH/C&S/HAGER/LEGRAND/INDO ASIAN.</p>	
Item No. 59	Supply of material, erection, testing & commissioning of Auto change over switch 63 Amp. as per specification.	
Explanation	<p>This includes supply, fixing, testing and commissioning of Automatic Change Over Switch 63 Amp Capacity, three phase 415VAC, weatherproof, outdoor type having canopy arrangement on top, front cover and to be fixed on wall with indication lamps. Cable shall be entered with suitable glands.</p> <p>Make: - Automatic Change Over Switch: - ASCO / ARISTO / HPL / HAVELLS / L&T / SIEMENS / ABB/ CROMPTON / STANDARD/ BCH/C&S/HAGER/LEGRAND/INDO ASIAN.</p>	
Item No. 60	Digging of trench	
Explanation	<p>This item includes excavation of trench in all type of hard/soft soil for laying of cables on a bedding of sand at the bottom of trench and covered the cable with layer of sand. The bricks / RCC slab shall be provided at sides & top of cable along full length of trench. The desired minimum depth of trench for laying low voltage cable below 3.3 KV shall be 0.75 meter. If, laying of cable at Railway level crossing/track (shall be laid in RCC pipe / HDPE Pipe of suitable dia as per IS 4984-1995 or latest), the minimum depth from bottom of sleepers to the top of pipe shall be 01 meter. After laying the cable, the trench should be refilled, re-leveled & restored to original shape. At locations, where required digging is not feasible, RCC/GS/MS pipe shall be laid below the track the payment will be made in proportionate to actual depth & length dug.</p> <p>There is no need to keep bricks/RCC slabs in trench where cable is passed thought RCC pipe/ GI/HDPE pipe. Quality of bricks/ RCC slabs shall be got approved by Railway engineer in-charge of work. This also includes cable route indicator with IR engraved and welded on 10mm MS rod at the center of cable route marker and "J" type hook designed at bottom of rod. The cable route marker shall to be provided at every 10 -15 meters length. The length of cable route marker shall be 1 Meter.</p> <p>It must be ensured that, Brick thickness should not be less than 4" and provided in full length of trench at sides & top of cable. Excavation for laying of cable</p>	

	underground should be as per IS 1255-1967. Note: - If the prescribed brick size is not available the approval to different bricks may be taken from site in charge / Sr. DEE (P)-RTM.
Item No. 61	Digging of Pacci trench
Explanation	<p>This item includes excavation of trench in cement Pebble block / CC Flooring for laying of cables on a bedding of sand at the bottom of the trench and covered the cable with layer of sand. The desired minimum depth of trench for laying low voltage cable below 3.3 KV shall be 0.75 meter. If, laying cable at Railway level crossing/track (shall be laid in RCC pipe / HDPE Pipe of suitable dia as per IS 4984-1995 or latest), the minimum depth from bottom of sleepers to the top of pipe shall be 01 meter.</p> <p>This also covers excavation of trench for laying of cable in all type of cemented flooring / Platform / Pebble block. In trench different sizes Cables shall be laid horizontally together & then all these cables shall be covered by 100mm thick layer sand at bottom & top of the cable. There is no need to keep bricks in Pakki trench. After laying the cable the trench should be refilled by Gitties (grommets) & reflooring by cement, sand mixture / Pebble block or as per site requirement. At locations where digging is not feasible, payment will be made in proportional to actual depth & length dug and there is no need to keep bricks in trench where cable is passed though RCC pipe / HDPE Pipe / GI pipe.</p>
Item No. 62	Supply and fixing of Distribution box with Rewire able switch fuse unit. (200A)
Explanation	<p>This includes design, fabrication, supply, testing, erection and commissioning of distribution box approx size 1000mm x 900mm x 500mm fabricated from 18SWG MS sheet, designed with provision of canopy, double door type, Powder coated. All hinged door and covers shall be provided with gasket with 4 Nos bus bar aluminium of suitable rating/capacity and size & 03 Nos Rewireable Porcelain Cut Out Type Fuse Units 200A/415V. The cut outs shall be fixed in distribution box on Teflon sheet of minimum 12mm thick of suitable size including connection. The board shall be vermin proof with both sides properly ventilated and shall having maintenance facilities from front, MS glands of suitable size for incoming/ outgoing cable. The metallic danger board shall be fixed/ provided on each door and shall have two Nos. earthing terminals. The incoming/outgoing cable shall be provided with crimped terminal lugs. This also included fixing on wall/pole or as per feasibility.</p> <p>Make: - 1. Rewireable porcelain fuse carrier and base shall be HPL / HAVELLS / L&T / SIEMENS / CROMPTON / STANDARD/ BCH/ C&S/ HAGER/ LEGRAND/ INDO ASIAN.</p>
Item No. 63	Supply, erection, testing & commissioning of horizontal mono block submersible pump set. the pump set shall be supplied with squirrel cage type induction motor having dynamically balanced rotor & winding of pvc insulated copper wire & water filled, for giving out-put at duty point head 23.5 mtrs (21-32 mtrs) at discharge 1050 LPM (690-1150 LPM) of capacity 7.5hp. the pump set shall be supplied with all relevant accessories. pump motor shall be energy efficient /star rated in terms of hp, head, discharge / efficiency.
Explanation	<p>This includes supply, erection, testing & commissioning of 3 PH, 415V AC Electrical Driven Mono-Block Horizontal submersible pump set. The pump set shall be supplied with squirrel cage type induction motor having dynamically balanced rotor & winding of PVC insulated copper wire & water filled, for giving output at duty point head 23.5 mtrs (21-32 mtrs approx.) at discharge of 1050</p>

	<p>LPM (690-1150 LPM approx.) of 7.5 HP capacity. The pump set shall be supplied with all relevant accessories.</p> <p>Note: -</p> <ol style="list-style-type: none"> 1. Pump Motor shall be energy efficient in terms of HP, Head, Discharge / efficiency with Energy efficient /Star rated by BEE (Star rated pump will be preferable). 2. Rotor of motor shall only be of copper wound accepted. 3. The bush of NDE, DE side shall be of minimum 65-80 mm length to cater load of rotor & Water pressure. 4. Efficiency on duty point on BEE website certification should not be less than 52%. <p>Make: - DUKE, CRI, FALCON, KSB, SAMUDRA, Varuna</p>
Item No. 64	Supply, erection, testing & commissioning of automatic starter for submersible pump set.
Explanation	<p>This includes design, fabrication, supply, erection, testing and commissioning of Starter panel for operation of pump set, operation on 415Volt, 3Phase, 50Hz AC, Front accessible, the size of fabricated panel shall be 510mm x 510mm x 260mm (+/- 2%). Panel shall be dust and vermin proof, both sides ventilation with wire mesh. Hinged door and cover shall be provided with gasket. Internal wiring shall be done through copper stranded PVC insulated cable of suitable size, ISI marked, FRLS, IS 694 with suitable copper terminal ends. The Panel shall be Indoor type, wall mounted, compact size, Powder coated with both sides properly ventilated & having sufficient space for maintenance. All accessories shall be fixed on Hylam Sheet of Suitable capacity. The control panel shall have locking arrangement in the front supplied with two keys. The panel shall be fabricated with 18 SWG MS sheet. The panel should consist of following components: -</p> <ol style="list-style-type: none"> a) Main MCB 32 Amp. triple pole 10KA (HPL / HAVELLS / L&T /SIEMENS / CROMPTON /STANDARD/ BCH /C&S/ HAGER/ LEGRAND/ INDO ASIAN/ BENLO) Suitable for Inductive load C curve type. b) Main contractor 22A with 02NO+02NC (SIEMENS, ABB, HPL, L&T, BCH, TC, SCHNEIDER) All contactor shall be AC-3 duty ratings NVC 415V. c) i) Overload relay, phase failure, unbalance, Phase sequence reversal, UV, OV protection with SPP with dry running (under current setting is adjustable & by pass features when to be used for motors operating on NO load currents. Three over load characteristics (2sec, 5sec, 10 sec) are selectable relay required with 2 change over output relay outputs (Model MINILEC: - S2CMR1/ D2 MPR2 or SELEC-MPR-3M, GELCO, SUN) with appropriate CTs of same make (Minimum 20/5A) ii) The Single Phasing preventer should have feature to operation time On delay of 30 sec-60 sec, otherwise separate SPP to be provide of Makes: - C&S,TC, LIDER, NAREN,SELEC or reputed make. (Special protection from frequent tripping due to supply failure) d) AC Three Phase Electronic Panel mounted multi-function meter, 3Lines LCD Display in 96X96 Sq mm, Flush mounted case, Accuracy class 1.0 emfisvifpe (Make :- SECURE/ SIEMENS/ ABB /HPL/ C&S/ L&T/ TRINITY.)

	<p>e) Water level Guard with probe with dual level monitoring & complete installation (MINILEC/GELCO/SUN).</p> <p>f) Indicator lamp's for R Y B phase, overload, run.</p> <p>g) Push buttons are provided to start & stop.</p> <p>h) Toggle switch double pole ON- OFF- ON for auto or manual operation.</p> <p>i) Analog Time switch Clock type. (GIC/GELCO/ PROTIME/L&T/ THEBEN/ HAVELLS).</p> <p>j) Power capacitor rectangular shape capacity (2 KVAR)–01No. (EPCOS, BCH, Havells, Schneider)</p> <p>k) Two Nos. Earthing terminal on control panel at suitable location.</p> <p>l) Control fuses HRC with Bakelite base of suitable capacity. Make: - GE/STANDARD or reputed make.</p> <p>m) Luminous Danger board in Hindi & English to be provided on control panel.</p> <p>n) Control Wiring 1.0 Sq.mm. make: - Any ISI make</p> <p>o) Power Wiring As per Amp. Make: - Any ISI make.</p> <p>p) Outgoing Terminal connector M8 stud type as per Amp. make: -ELMEX / WAGO/PHOENIX /CONNECTWEL.</p>
Item No. 65	SUPPLY, ERECTION OF GI PIPE.
Explanation	This includes supply of material, fixing & erection of GI pipes 50-100mm 'B' class with heavy-duty socket for delivering water.
Item No. 66	SUPPLY & ERECTION OF GI COUPLING SOCKET.
Explanation	This includes supply of material & fixing of G. I. coupling Socket 3" long heavy duty properly connected on delivery pipe at suitable location as per site requirement.
Item No. 67	SUPPLY & ERECTION OF NON-RETURN VALVE.
Explanation	This includes supply of material & fixing C.I. non return valve horizontal type as per suitable for 50-80 mm dia pipe properly connected on delivery side at suitable location as per site requirement. As Per IS 5312 - Part 01. (ISI Marked). Make –Zoloto ,Hammer, kirloskar, kartar
Item No. 68	SUPPLY & FIXING OF GI FLANGE.
Explanation	This includes supply & fixing GI Flange Suitable for GI pipe.
Item No. 69	SUPPLY & ERECTION OF GI BEND.
Explanation	This includes supply & fixing GI Bends Suitable for GI pipe.
Item No. 70	SUPPLY & LAYING OF FLAT CABLE PVC COPPER 3 CORE 10MM².
Explanation	This includes supply of material, erection, testing and Commissioning 3 core 10mm ² PVC flat flexible copper cable from motor control panel board to motor. Make: - FLAT COPPER CABLE 3 CORE FINOLEX / KEI /HAVELLS / HPL / RR Kabel /KSB make conforming to IS 694.
Item No. 71	Providing 100mm dia. GI/MS Pipe under track by pushing method.
Explanation	This Includes Supply & laying of GI/MS pipe 100 mm Dia bore spigot & socket type as per IS 1239 or latest, under Railway track 1.5 meter below. During the horizontal boring by pushing method, Railway track formation shall not be affected. This also includes required tools, tackles, manpower and work shall be ensured with safety & securely.

PARTY DETAILS FOR BILLS RECOVERABLES/SERVICES PROVIDED**1. PARTICULARS FOR GST & INCOME TAX.**

i) Name of Party (Service Recipients) : _____

ii) GSTIN: _____

(Please enclosed a hard copy of state wise / business wise GSTIN registration number)

iii) Description of Service _____

iv) Nature of Business: ANCILLARY SERVICE

v) HSN/ASC code: _____

vi) PAN No. _____ (Please enclosed copy of PAN Card)

2. COMMUNICATION ADDRESS (Place of Bussiness)

i) ADDRESS: _____

ii) DISTRICT: _____

iii) STATE: _____ PIN: _____

iv) PHONE NO.: _____ MOBILE _____ FAX NO. _____

v) EMAIL-ID _____

3. BANK DETAILS OF PARTY

i) BANK NAME: _____

ii) BRANCH: _____

iii) BANK ADDRESS: _____

iv) BANK IFS code: _____

v) BANK ACCOUNT NO.: _____

(Please enclose a cancelled blank cheque)

vi) ACCOUNT TYPE: SAVINGS/CURRENT/CASH CREDIT) _____

4. DECLARATION BY THE PARTY

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

Date: _____

Signature of the party with Stamp