

TENDER SCHEDULE

Name of Work:- Elect work related to- Surendranagar-Dhasa section : Replacement of Porta cabin at recently manned level crossings by providing permanent structure at (25 LCs) in PRCL sec.

SN	Description	Qty. Name	Rate	Unit	Total Amt.
1	SETC of concealed/surface wiring of light/fan/exhaust fan/call bell point.	150	384	Nos.	57600
2	SETC of concealed /surface wiring of sub-main with 4 sq mm copper wire in PVC conduit.	2000	105	mt	210000
3	Providing of 6 amp socket with plug on existing board.	25	166	Nos.	4150
4	SETC of two switches and socket 6 amp	25	201	Nos.	5025
5	SETC of Energy Efficient BLDC ceiling fan of 1200 MM sweep with regulator & all other Accessories as per specification.	25	3333	Nos.	83325
6	SETC of 18 W LED tube light fitting as per specification.	100	484	Nos.	48400
7	SETC of MCB DB with incoming 32 amp DP MCB& outgoing 4x16 amp DPMCB as per specification	25	2709	Nos.	67725
8	Digging and excavation of trench 450x1000 mm in RCC/ PCC/ hard soil and refilling etc as per specification.	1000	406	mt	406000
9	Transportation, laying, installation, terminating, testing and commissioning of LT/HT cable of sizes 4*10-4*300 in exist trench, pipe or on structure	1000	33	mt	33000
10	Supply and laying HDPE pipe 110 mm pipe by push method under track/road	400	553	mt	221200
11	Supply of ISI marked XLPE insulated and PVC sheathed armored aluminum cable of 4 core 16 sq.mm as per specification.	1000	115	mt	115000
12	Supply of materials and providing 50 mm dia. G.I. pipe earthing with B class GI pipe as per IS 3043-1987 as amended latest & as per drg.	25	6493	Nos.	162325
13	SETC of Off grid solar PV Power plant 1.5KWp with monocrystalline panel and battery backup as per specification	23	89900	set	2067700
TOTAL					3481450
Rs. Thirty Four Lakh Eighty One Thousand Four Hundred Fifty Only.					

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THE SCOPE & SPECIFICATION OF WORK

NAME of work Elect work related to- Surendranagar-Dhasa section: Replacement of Porta cabin at recently manned level crossings by providing permanent structure at (25 LCs) in PRCL sec.

Note:-Before starting of work, contractor is required to take approval of make and also model no of all items from SRDEE/P/BVP office, Design/model & make/Brand of items given here are tentative and can be changed by Sr.DEE/P/BVP as requirement of particular location. For switch board items:- All switch boards and accessories should be of modular type only.

ITES Condition: -Inspection of the materials costing more than Rs. 5 Lac will be carried out by RDSO/ITES at the Manufacture's premises prior to dispatch in presence of contractor's representative. All the materials/equipment to be supplied shall confirm to the relevant specification only. The inspection charges of all items will be borne by contractor. However in the event of emergencies, Railway reserves the right to change the inspecting authority from ITES/RDSO to Consignee with the approval of officer i.e. Sr. DEE/P/BVP.

NS-1- SETC of concealed wiring of light/ fan/exhaust fan point :- The price shall cover for concealed wiring of light/ fan/common light point/ exhaust fan point with 1.5 mm² multi-strand, PVC insulated, unsheathed FRLS copper conductor of 1100 volt grade, ISI marked conforming to IS:694/2010 with 1.5 mm² multi-strand, PVC insulated, unsheathed FRLS copper conductor of 1100 volt grade ISI marked conforming to IS:694/2010 as earthing wire with all accessories in concealed type of wiring in medium grade PVC conduit and accessories of

make as per list.

NS-2- SETC of concealed wiring of sub-main with 4 sq mm copper wire :- The price shall cover for concealed wiring of sub-main with two wire single core 4.0 mm² PVC insulated, unsheathed, multi-strand, FRLS copper conductor of 1100 volt grade, ISI marked conforming to IS:694/2010 with one wire of 4.0 mm² PVC insulated, unsheathed, multi-strand FRLS copper conductor of 1100 volt grade, ISI marked, conforming to IS:694/2010 in concealed manner as per site requirement in PVC conduit.

Make of wire – as per list.

NS-3:- Providing of 6 amp socket with plug on existing board:-The price shall cover for providing modular type plug point with flush type universal 5 pin socket and modular switch 5/6 amp, 230 Volt AC on existing board.

Make – as per list.

NS-4- SETC of two switches & sockets of 6 amp:-The price shall cover for wiring of multi-plug point (Switch 6 Amp – 2 nos and 5 – pin socket, 6 Amp – 02 nos.) on separate surface mounted polypropylene switch board with modular cover plate of suitable module with 2.5 mm² PVC insulated, unsheathed, multi-strand, FRLSH copper conductor of 1100 volt grade, ISI marked conforming to IS:694/1990 with 2.5mm² PVC insulated unsheathed, multi-strand, FRLSH copper conductor of 1100 volt grade, ISI marked

conforming to IS:694/2010 as earthing wire in medium grade PVC casing capping, double lock type, ISI marked,

Make – as per list.

NS-5:- SETC of Energy Efficient BLDC ceiling fan of 1200 MM sweep: Contractor has to supply, erection, testing and commissioning of 5 star rated energy efficient BLDC type ceiling fan of 1200 MM sweep & white color preferred, maximum wattage 35W with remote control & all other accessories as per requirement. **Specification should be as per IS-374:2019 or latest.**

Make - as per list.

NS-6 :- SETC of 18/20W LED tube light fitting :-The Contractor shall have to supply, erection, testing and commissioning of energy efficient LED based luminaries complete with all accessories, including 18/20 W LED type tube light. The LED tube light shall be Approx. 4' long with suitable current control drive circuit including mounting arrangement shall be suitable for room and, office complex, of Indian Railway for indoor application (IP-20).

The luminaries shall be **LED type tube light complete with fitting 18/20 watt suitable for 220volt, 50Hz AC and should be comply WR Specification No. WR/CCG/Specification/P/001(Rev.01) /2018**

The contractor shall have to connect the **LED type tube light fitting 18/20 watt** indoor fitting by 1.5mm square mm 3 core flexible copper cable ISI marked at nearest supply point.

Suitable no. of LED lamps shall be used in luminaires. LED lamps of make NICHIA/ CREE/ OSRAM/ SEOUL/ PHILIPS/ LUMILEDS/ LEDNIUM/ AVAGO , LED luminaries with, reputed make shall be used for the indoor application. The manufacturer shall submit the proof of procurement of LEDs from above OEMS at the time of testing.

(2) Manufacturer's certificates

Manufacturer should submit the certificate of having purchased LED from one of the approved source (LM-79 & 80 certificate should be submitted)

Manufacturer's test certificate to be submitted for (i) Mechanical strength (ii) Endurance test and Thermal test, (iii) Resistance to dust and moisture, (iv) Insulation resistance and electrical strength, (v) resistance to heat, fire and tracking and (vi) photo-metric tests as per the IS 10322 Part-5, Sec.-2.

(2) Guarantee

The complete system of LED lights (including Driver etc.) shall be guaranteed for satisfactory performance and manufacturing defects for a period of 60 months from date of commissioning or 72 months from the date of supply whichever is earlier.

The luminaries shall be suitable for rugged service under the operational and environmental conditions encountered during service as specified in luminaries and mounting accessories shall be suitable for room and, office complex, of Indian.

As per Super ECBC guideline output of LED tube light should be minimum 120 lumen/watt or more.

Make – as per list..

NS-7:- :- SETC of the MCB DB should be supplied with following provision:-

(1) 32 Amp double pole MCB, 10 KA breaking capacity 250V AC – 01 No (Incoming)

(2) 16 Amps double pole MCB 10 KA breaking capacity 250V AC – 04 Nos (outgoing)

The MCB DB should recess mounting confirming to IS 8623-3 powder coated made from CRCA sheet enclosure having top and bottom detachable gland plates with knock outs for cable entry connections of incomer and outgoing suitably with mounting arrangements of key holes for wall as per site requirements. The MCB DB should be provided with internal wiring connections and also include cable connections of

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incoming and outgoing with suitable cable glands Etc. The MCB should conform to IS: 13947-2.PVC numbering Sleeves to be provided to all the wires both ends for identification purpose.

Make – as per list.

NS-8 : Digging of cable trench of size 450x1000 mm :- The contractor shall have to do digging trench back filling and laying of cable in trench of size 450x1000 mm. Digging in RCC/PCC/hard soil 1000 deep and 450 mm width and making sand and bed 8.0Cm thick and bottom below the cable and bricks on top of cable and refilling the trench after laying cable .

Cable shall be laid between poles, main boards, in trench such as per instruction of site supervisor. The cable in trench shall be laid as per instruction of site supervisor.

The installation of cable including joints shall be carried out in accordance with code of practice as specified in relevant **IS- 1225-1983** as amended latest.

Before laying is under taken the route shall be marked in consultation with Railway's representative at site. While selecting cable route, corrosive soil, ground surrounding sewage effluent etc. Shall be avoided & cable route marker should be provided at equal length of about 10-20 mtrs. Distance.

The width and depth of excavation shall be done as per instruction of site supervisor, for underground cables adequate protection shall be taken not to damage any existing cable(S), pipes or other such installations coming in the proposed route during excavation. Where brick, tiles or protective covers or bare cables are encountered, further excavation shall not be carried out without consultation and approval of the Railway's representative at site..

All cables before lying shall be tested with megger. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance between conductors to earth/sheath/armored and insulation resistance between conductors.

The trenches shall be back filled with excavated earth free from stones or other sharp edged debris and shall be rammed and watered. Unless otherwise specified a crown of earth should not be less than 50mm in the center and tapering towards the sides of the trench filling as may be required.

Make – as per list.

NS-9:- :-Transportation, laying, installation, termination, testing and commissioning of LT cable of size 4 x 10 sq mm to 4 x 300 sq mm:The contractor shall have to transport all the cables of size 4 x 10 sq mm to 4 x 300 sqmmto be used at site shall be issued by Railway from SSE/EL OR other places suggested by Rly and balance material shall also to be deposited back to concerned SSE/EL. Contractor shall lay the cable in existing trench, pipe & on Wall/ structure.

Before laying the cable in the ground / Pipes or on the wall/pillars/cable tray cable should be secured properly by providing saddling/clamping arrangement of proper size at suitable interval.

Before and after laying the cable, the IR value should be checked and the contractor shall arrange all the testing instruments. In case of any failure contractor will again re-lay the cable at his own cost.

Armoring of the cable shall be earthed at both end of the cable.

Wherever the cable comes out of the ground at least one loop of sufficient radius should be provided under the ground.

While laying the cable and while digging the trench it should be ensured that no obstruction should come in way of drainage line, power cables, telecommunication cables etc.

If any damage done, contractor will make good the cost of damage as decided by railway.

Make – as per list.

NS-10:- Supply and laying of HDPE pipe 110mm pipe by Push through method under track/road:

The contractor shall supply HDPE (High Density Poly Ethylene) pipe of 110mm nominal dia. as per IS 14930 ptII with latest accessories required for laying such as coupler, bend etc.

Material grade and class	Description	Nominal diameter (mm)	Wall thickness of pipes (mm)
PE-80 & PN-4	HDPE (High Density Polyethylene) pipe	110	7 mm

The contractor shall lay the HDPE pipes beneath the track/ road by horizontal direction drilling/ boring 150mm. dia. and shall be done at the depth of minimum 1.5 meter or as requirement of site from the ground level. Contractor has to do laying of HDPE pipe and cable in the pipe length.

If any hard /stony soil, Contractor should adopt new technology method in push through method or digging of trench.

Each length of the pipes shall be joined together properly using proper size of socket and aligned in a straight line, keeping an inclination to facilitate the draining of water.

Each length of the pipes shall be joined together properly using proper size of socket and aligned in a straight line, keeping an inclination to facilitate the draining of water.

NS-11:- :- Supply of ISI marked XLPE insulated and PVC sheathed armoured aluminium cable of 4 core 16 sq.mm: Contractor have to supply, of LT 4 core 16 sq.mm, ISI mark Aluminum XLPE PVC insulated and PVC sheathed armored 1.1 KV grade cable as mentioned in schedule of rates and quantity confirming to IS 7098, part I-1988 or latest.

NS-12: Supply, erection, testing and commissioning of GI pipe earthing:

Provision of pipe earthing should be carried out strictly as per IS 3043 – 1987 as amended latest with G.I. pipe having nominal bore dia. 50 mm, medium class (“B” class), conforming to IS: 1239 (part-1) 1990 as amended latest and 3 Mtr. in length. The earth resistance value of all earthings will be displayed on the earth chamber along with the date on which earth resistance tested. Earth resistance should be measured and tested jointly.

Proper connecting arrangement with G.I. nut and bolts of suitable size shall be provided at the top end of the pipe-earthing electrode.

The G.I. earthing wire ends shall be clamped between two G.I. washers of sufficient size and properly tightened with G.I. nuts and bolts of suitable size.

The end sealing G.I. cap shall be provided at the top of the pipe-earthing electrode.

The main earthing lead shall be of 2 wires of 8 SWG galvanized iron, the earthing lead shall be suitably protected from mechanical injury by being recessed in walls where ever exposed.

The earthing lead shall be buried 30 cm below ground level and carried in 12.7 mm (1/2”) G.I. pipe up to the entry in the service building. 2 X 8 SWG G.I. wires on one end should be connected to earth electrode and

other end to main board, Distribution boards etc. A pre casted earthing chamber of cement concrete with cover shall be supplied and provide on each earthing.

Sufficient Quantity shall be use of salt, charcoal alternate layer of 600 mm each around the earthing electrode to filling up to top of electrode.

Earthing resistance value should be less than 5 ohm after completion of work should be measured & written on earth chamber.

NS-13:- Supply erection testing and commissioning of 1.5 KWp off grid solar plant with battery back up as per following specification :-

Sr. No	Specifications/ Description of works (for each system)
1	<p>Solar PV Modules:</p> <ul style="list-style-type: none"> i. Solar Photovoltaic Modules: 03 nos. each module shall be 550Wp or above capacity). Capacity shall be calculated on top face of the module and generation from bottom face shall be extra. ii. SPV module shall be made of MONO PERC HALF - CUT BIFACIAL (or better) silicon solar cells. The solar cell shall have surface antireflective coating for absorption of more light in all weather conditions. iii. Photo conversion efficiency of SPV Module should be greater than 20%, system voltage 1500 Volts maximum. Module shall be made of high transmittance glass surface giving high encapsulation gain. iv. Stabilized output of the Solar Power Plant should not be less than rated kWp under Standard Test Condition after one year of operation from the date of Commissioning. v. The solar modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation shall be compatible with the thermal expansion properties of the Silicon cells and the module framing arrangement/material. The encapsulation arrangement shall ensure complete moisture proofing. vi. Module frame: Anodized Aluminum. vii. Photovoltaic Modules shall comply with the following standards as per BIS standards <ul style="list-style-type: none"> a) IS 14286 : 2010/ IEC 61215 : 2005 b) IS/IEC 61730 (PART 1) : 2004 c) IS/IEC 61730 (PART 2) : 2004 viii. Only solar PV panels listed under latest & valid MNRE ALMM list & with valid BIS license shall be accepted.
	<p>Off grid Solar Inverter with Hybrid option : -</p> <ul style="list-style-type: none"> i. Compatibility : Lithium ion battery (LiFePO4) for solar application. ii. Control: Microprocessor /DSP, Power selection: Solar- Battery - Grid. iii. Rating: 1.5 KVA or higher, Nominal AC output voltage and frequency: 230V, 50 Hz (Single phase), Pure sine wave. iv. Charge controller: MPPT (in built) v. Input Voltage (DC) range: 120V to 450V (or higher) for single phase. vi. Grid Frequency Synchronization range : +/- 5 Hz vii. Ambient temperature considered : -20 degree C to 60 degree C viii. Humidity: 95 % Non-condensing . ix. Protection of Enclosure : IP-65(Minimum) for outdoor. x. Grid Voltage tolerance: -20 & +15

2	<p>xi. No-load losses: Less than 1% of rated power.</p> <p>xii. Inverter efficiency(minimum) :> 95%</p> <p>xiii. THD : <3%</p> <p>xiv. PF : > 0.95</p> <p>xv. Display: Inverter should have user friendly LED/LCD display for programming and web monitoring.</p> <p>xvi. PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.</p> <p>xvii. Interface: RS485/RS232/Wifi/LAN, Built-in meter and data logger to monitor plant performance through external computer/ Mobile app shall be provided.</p> <p>xviii. Protections to be included and shall be operational at all times of inverter operation:</p> <ol style="list-style-type: none"> Over voltage both at input & output. Over current both at input & output. Over/under grid frequency. Heat sink over temperature. Short circuit. Protection against lightning. <p>Technical Explanatory Note</p> <p>Following technical specifications/details shall be followed for provision of 1.5 KW Solar System and its accessories</p>
`	<p>xix. The inverter shall be able to withstand an unbalanced load conforming to relevant IEC standard and Indian electricity condition. The inverter shall include appropriate self-protective and self-diagnostic features to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the safe operating range due to internal or external causes. The self-protective features shall not allow signals from the inverter from panel to cause the inverter to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the inverter, including commutation feature, shall be cleared by the inverter protective devices and not by the existing site utility grid service circuit breaker.</p> <p>xx. The Bidder shall provide data sheet for inverter along with their offer as per Guaranteed Technical Particular.</p> <p>xxi. The PCU/ inverters should be tested from the MNRE approved test centres/ NABL/ BIS/ IEC accredited testing- calibration laboratories.</p> <p>In case of imported power conditioning units, these should be approved by international test houses.</p>
4	<p>Lithium Ion battery:</p> <ol style="list-style-type: none"> Rating: Rated Voltage (12.8 V/24 V or higher) & Number of battery shall be suitable to supply AC (230V, 50 hz) load of 300 watt for minimum of 12 hours back up. Back up shall be tested after installation jointly by representative of contractor along with concerned SSE(Elect). Type: LFP (LiFePO₄), with smart BMS (battery management system). Enclosure: Metal/ABS IP65 (or higher) rated. Maintenance free, built in over voltage, under voltage, short circuit & thermal protection. Compatibility: Compatible with Hybrid inverters. DOD (depth of discharge): 80% or higher Temperature tolerance: 0 degree to 60 degree (or better) Communication: RS485. Warranty: Minimum 5 years (OEM warranty certificate to be handed over with supply).
	<p>Module Mounting Structure:</p> <ol style="list-style-type: none"> Hot dip galvanized MS mounting structures (MMS) with AZ-150-550 mpa strength to be

5	<p>used for mounting the modules / panels / arrays. Thickness of galvanization shall be at least 85 microns.</p> <p>ii. The module alignment and tilt angle shall be decided based on the location of array installation. It shall be mounted facing south and tilted to an angle equal to the latitude (where being used), for optimum performance. Tilt angle shall be as approved by Sr.DEE/P/BVP.</p> <p>iii. There shall be a minimum air gap of 25 mm between the facing edges of two adjacent modules on all sides.</p> <p>iv. Each panel frame structure shall be fabricated as to be grouted on Roof on its legs. Mounting technique should be such type in which drilling not required on roof.</p> <p>v. A weather proof junction box as per the relevant specifications is to be provided where the module terminals shall be interconnected and output taken.</p> <p>vi. All nut bolts, and fasteners should be made of SS304 Grade or latest.</p> <p>vii. The structure shall be designed to allow easy replacement of any module and shall be aligned with site requirement.</p> <p>viii. The structure shall be designed for simple mechanical and electrical installation and shall be supplied complete with all members to be compatible for allowing easy installation at the rooftop site.</p> <p>ix. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.</p> <p>x. MMS shall be designed to withstand wind speeds of up to 150 Km/hr. The systems shall be installed on roof top with CC block of suitable and approved size for fixing the standing structure.</p> <p>xii. The legs of the structures made with hot dip GI member will be fixed and grouted in the RCC foundation columns made with 1:2:4 cement concrete. The foundation shall be as per design of the structure to withstand maximum wind flowing load (wind speeds load of up to 150 Km/hr.).</p>
6	<p>Junction Boxes (JBs):</p> <p>i. The junction boxes (JBs) are to be provided in the PV array for termination of connecting cables.</p> <p>ii. The JB's shall be with full dust, water & vermin proof arrangement.</p> <p>iii. All wires / cables must be terminated through cable lugs. Cables to be terminated in DIN rail mounted terminal blocks.</p> <p>iv. The JB's shall be such that input & output termination can be made through suitable cable glands.</p> <p>v. Copper bus bars / terminal blocks housed in the junction box with suitable termination threads Conforming to IP65 standard and IEC 62208 or latest Hinged door with EPDM rubber gasket to prevent water entry.</p> <p>vi. Single / double compression cable glands.</p> <p>vii. Provision of earthing.</p> <p>viii. It should be placed at 5 feet height [or height as approved by Sr. DEE/P/BVP for ease of accessibility.</p>
7	<p>AC Distribution Panel Board:</p> <p>i. All switches and the circuit breakers, connectors should conform to IEC 60947: part I, II and III/ IS 60947: part I, II and III with latest amendment.</p> <p>ii. The changeover switches, cabling work shall be undertaken by the Firm as part of the project.</p> <p>iii. All the Panels shall be metal clad, totally enclosed, rigid, air - insulated, cubical type suitable for operation on three phase (415 V) / single phase (230 V), 50 Hz system [As per list of locations provided by Railway and as advised by site engineer]</p> <p>iv. The panels shall be designed for minimum expected ambient temperature of 45 degree</p>

	<p>Celsius, 80 percent humidity and dusty weather.</p> <p>v. All indoor panels will have protection of IP54 (or higher grade). All outdoor panels will have protection of IP 65 (or higher grade).</p> <p>vi. The ACDB shall have suitable Type-II SPD (Surge protection device) and R, Y, B phase indication with control MCB.</p> <p>vii. Shall conform to Indian Electricity Act and rules (up to latest amendment).</p>
8	<p>DC & AC Cable: i. Single core, 6 sq mm Annealed Flexible solar DC Cable class 5 annealed Tinned copper conductor with XLPO, fine wire according to IEC 60228 with latest amendment, Rated DC voltage 1.5KV, temperature range: - 10 degree C to + 120 degree C, Black color suitable for outdoor use, Halogen-free, cold resistant, flame-retardant, temperature resistant, UV-resistant, Ozone- resistant, waterproof (TUV APPROVED).</p> <p>ii. Interconnected AC copper flexible 4 Core cable (Size as per site requirement) 1.1KV XLPE/PVC flame-retardant temperature resistant, UV resistant, aluminium armoured cable as per IS:7098 (part 1), IS:8130, IS:5831, IS: 3975 with latest amendment and all necessary cables supply and installation will be taken as per load to run the system successfully and satisfactorily.</p> <p>iii. Rating of cables shall for the complete solar system shall be as per the current ratings and shall be safe to operate on full load.</p>
9	<p>Lightning & Surge Protection: -</p> <p>The SPV power plants shall be provided with lightning & over voltage protection. It shall be capable to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc.</p> <p>The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors conforming to IEC.</p> <p>The complete solar system shall be provided with suitable surge protection system.</p>
10	<p>Earthing Protection: -</p> <p>Each array structure of the PV yard shall be grounded/ earthed properly as per IS: 3043-1987. In addition the lightning arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of Sr. DEE/P/BVPas and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB shall also be earthed properly.</p> <p>Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.</p> <p>3 earth pits with copper bonded rod at least 3 mtr with earthing compound for DC system (panels & structure & DCDB), AC system (inverter & ACDB) & Lightning protection shall be separate.</p> <p>GI flat of size 25 mm x 3 mm (or higher size) shall be supported with insulators at 1mtr. interval and properly secured as per site requirement as advised by consignee.</p> <p>Cost of all the earthing system including all parts, accessories, connection, testing and masonry & finishing work has been included in the price.</p>
11	<p>Grid Islanding:</p> <p>i. In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as "Islands."</p> <p>Powered Islands present a risk to workers who may expect the area to be non powered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.</p> <p>ii. A manual disconnect 4-pole isolation switch beside automatic disconnect switch of grid shall</p>

	also be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance.
12	<p>Miscellaneous Materials Specifications:</p> <ul style="list-style-type: none"> i. Connectors & Termination: Cable terminations shall be made with tinned copper crimped type solder less lugs of reputed make for all aluminium conductors and stud type terminals. ii. Cable Identification: Cable tags shall be of 2 mm thick, 20 mm wide aluminium strap of suitable length to contain cable number, equipment no. etc. iii. Ferrules: Ferrules shall be of approved type size to suit core size mentioned and shall be employed to designate the various cores of control cable by the terminal numbers to which the cores are connected for ease in identification and maintenance. iv. Cable Glands: Cable glands to be supplied shall be nickel-plated Brass double compression type of reputed make. v. Cable Trays: This shall be pre-fabricated hot dip galvanized sheet steel tray of suitable Size. vi. Cable Laying: All cable routes shall be carefully measured and cables cut to the required lengths, leaving sufficient lengths for the final connection of the cable to the terminal of the equipment. The various cable lengths cut from the cable reels shall be carefully selected to prevent undue wastage of cables.
13	<p>Pre Dispatch Inspection:</p> <p>Railway may conduct pre dispatch inspection of material at manufacturer's site if required. Contractor shall make necessary arrangement accordingly.</p>
14	<p>Drawing/Certifications Approval:</p> <p>Following drawings shall be submitted by contractor after placement of work order:</p> <ul style="list-style-type: none"> i. General Arrangement of System (GAD). ii. The bidder shall carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labour. The bidder shall submit the array layout drawings along with Shadow Analysis Report to Railways for approval. iii. Part drawing of structures and Overall plant layout. iv. Complete Electrical drawing of system (detailed SLD) and Schematic diagram for complete solar system. v. Weight analysis of system. vi. Civil foundation drawings. vii. Wind Speed withstand capacity certificate duly certified by chartered engineer. viii. STAAD Report duly certified by chartered engineer. ix. The bidder shall submit preliminary drawing for approval and based on any modification or recommendation by Railways, shall submit three sets of final drawing and soft copy for formal approval to proceed with construction work. x. Quality assurance plans for project execution.
15	<p>Standard/Certificate:</p> <ul style="list-style-type: none"> i. The goods supplied and works executed under this contract shall conform to the standards mentioned in the technical specification and where no applicable standard is mentioned, the latest version of Indian Standard Institution or Bureau of Indian Specification shall be applicable. ii. The Bidder shall submit all the valid test certificates and reports of the system components following the latest MNRE Guidelines and the same components shall be supplied for which the test reports/ certificates are to be submitted.

16	<p>WARRANTIES:</p> <p>i. Product Warranty: The firm shall warrant the Solar Module(s) to be free from the defects and failures specified below for a period not less than Five (5) years from the date of commissioning.</p> <p>ii. Defects and/or failures due to manufacturing.</p> <p>iii. Defects and/or failures due to quality of materials.</p> <p>iv. Non conformity to specifications due to faulty manufacturing and/or inspection processes.</p> <p>If the solar Module(s) fails to conform to this warranty, the firm shall be liable to repair or replace the solar module(s) at their own cost and ensure satisfactory performance.</p> <p>v. Performance Warranty: PV module to be warranted for linear performance Warranty for 10% degradation from 2nd year to 10th year and 20% degradation up to 25th year on rated power generation.</p> <p>vi. The offered solar module performance test report issued from authorized MNRE/NABL/IEC/ILAC test lab should be submitted to Railways.</p> <p>vii. The firm shall provide warranty for inverters for minimum 36 months from the date of commissioning.</p> <p>viii. The firm shall provide warranty for Batteries for minimum 36 months from the date of commissioning.</p> <p>ix. The details of service centers in India shall be provided along with the offer. All essential materials and manpower shall be placed at the service centers to ensure quick and efficient after sales service.</p> <p>BEFORE PASSING OF BILL, THE FIRM SHALL BE REQUIRED TO SUBMIT NECESSARY DOCUMENTS TO ENSURE WARRANTY/ GUARANTEE (AS APPLICABLE AGAINST DIFFERENT ITEM) FROM MANUFACTURER/ AUTHORISED ORGANISATION. THIS SHALL BE CONFIRMED ALONG WITH BID DOCUMENTS.</p>
17	<p>Test reports / certificate from IEC/NABL/ILAC accredited laboratory to be mandatorily enclosed for relevant IEC / Equivalent BIS Standards.</p>
18	<p>Electrical:</p> <p>i. LT distribution grid specifications 230 +/- 5%, 50Hz and frequency variation as per IE rules.</p> <p>ii. The output of the inverter shall be fed into 240V/415V, AC LT grid as per site requirement.</p> <p>iii. The inverter output shall be connected to LT line prior to the LT/DG changeover switch. The mandatory islanding protection provided by inverter shall isolate the Solar PV power plant.</p> <p>iv. The load energy meter operation shall be completely independent of the plant AC energy meter.</p> <p>v. The energy meters shall be provided with communication interface and necessary data cables for remote monitoring. Modem, GPRS SIM (4G or above) for internet shall be provided with connections.</p> <p>vi. The monitoring of the system shall be suitably integrated with mobile application for remote access.</p>
19	<p>Online Generation Monitoring System for Solar Rooftop Installations:</p> <p>The cost is inclusive of provision of Generation monitoring system to ensure proper functioning of all roof top solar installations. System shall be able to continuous monitor and identify underperforming or faulty solar panels, give immediate alerts on faults and ensure optimized generation. The system shall also be able to collect data for regulatory reporting and compliance with renewable energy commitments.</p>

	Accordingly inverters shall have all the requisite features including wifi/GPRS
20	The price shall include all the requisite accessories and materials necessary for completion of the work in all respect to the full satisfaction of Railway authority and not to be limited to above mentioned description/ specifications. The works shall be executed as advised by site
21	In case of any ambiguity in the General specification or Technical Details, clarifications/ necessary documents may be collected from Sr.DEE/P/BVP office before the bid if required. All the items pertaining to Electrical systems shall conform to relevant IS or equivalent international standard. Any deviation must be got approved by Sr.DEE/P/BVP.
22	Survey: The bidder shall satisfy themselves by actual inspection of the site and locality before bidding. Before execution of work by the successful bidder, site survey must be done jointly with the concerned Supervisors of Railways. A survey report must be submitted for the selected locations with all relevant details.
23	The solar plants shall be commissioned at various LC gate locations (58 nos.) over BVP Division as per list of locations provided by Railway. However, location and quantity may change as per requirement of Railways which shall require approval of Sr.DEE/P/BVP.
24	Transport: Transport of all the materials to site required for complete installation and commissioning of the solar systems including all assemblies and accessories shall be sole responsibility of the contractor and no extra charge is payable for the same by the Railways.
25	Make: i. Solar PV Panel: Make and models enlisted under MNRE's latest ALMM vide F.No.283/41/2024-GRID SOLAR dated 27.03.2025 with latest amendment if any subject to valid BIS registration. Guidelines issued vide MNRE's O.M. No. 283/54/2018-GRID SOLAR-Part (2) dated 20.05.2024 shall be complied. ii. Hybrid Inverter: Suvastika/Delta/SMA/Waaree/Sofar/Luminous/Microtek/Smarten power/Exide/UTL/Solar/Solis/Ksolare/UTL/Luminous/Okaya/Microtek/Exide/Loom/APS/Servotech/Smarten iii. Lithium ion Battery: UTL/Su-vastika/Loom/nexus/Waree/Amararaja/Luminous/Okaya/Exide/Servotech/V-guard iii. Wires PVC insulated and PVC sheathed FRLS /control wires (IS marked): Finolex/Gloster/Polycab/KEI/RR Kabel/Havells iv. XLPE/XLPO cable: Polycab/Havells/KEI/Gloster/Universal/BCH v. Switch Fuse unit/ HRC Fuses: L&T/Havells/C&S/Siemens/BCH vi. Distribution Board MCB/RCCB/MCCB: Legrand/ABB/Siemens/Havells/C&S/L&T/BCH vii. Changeover switch: L&T/Havells/C&S/BCH/Schneider/ABB viii. Lightning arrester: ABB/Avon/True power/ Ennob/JMV/Alltec ix. Chemical earthing: JMV/Ashlok/ Vivek/OBO Bettermann/ CAPE Electric x. Energy meter: Secure/L&T/Conzerv/HPL/Enercon Makes of items not mentioned above shall be reputed make conforming to relevant standard specifications (IS/IEC/ standard mentioned under Schedule) and shall be as per Railway's preference as approved by Sr.DEE/P/BVP. Make of offered items shall be furnished along with the bid document and must be included under GTP submitted for approval before execution of work

THE LIST OF MAKES TO BE USED IN WORKS

Sr. No.	Item	Makes
01	Cables and Wires - LT PVC insulated, sheathed	CCI, KEI, Finolex, KEC, Polycab, Avocab, R.R.Kabel, HPL, BCH, Havells, Anchor by Panasonic, Universal cable, Nicco cable,
02	PVC casing capping, VC switch board	Prestoplast, Precision, Modi, Volex, Win, Press Fit, Anchor by Panasonic,
03	Switches, Sockets, plug, socket of Modular type boxes & accessory in wiring Accessories, ceiling rose etc. Regulators for fans	LK, Havells, Legrand, Anchor by Panasonic, Siemens, Cabtree, Elleys, HI-FI, Indo-Asian,
04	PVC Conduit and accessories	Prestoplast, Precision, Modi, Press Fit, Polycab, Anchor/ Panasonic, Astral, Supreme.
05	LED Fitting	Havells, Bajaj, Philips, Crompton, Jaquar, C&S, Halonix, Surya Roshni, Polycab, Wipro, Anchor by Panasonic
06	Ceiling Fans / BLDC Fans / Wall bracket fans / Exhaust fans / Pedestal fans / Air circulators / HVLS fans	Havells, Bajaj, Orient, Usha, Crompton, Khaitan, Anchor by Panasonic, Atomberg, Superfan, V-Gaurd
07	Electronic fan regulator	LK, Havells, Legrand, Anchor by Panasonic, Siemens, Cabtree, Elleys, HI-FI, Indo-Asian,
08	Air conditioners	Blue star, Voltas, LG, Fedders Lloyd, Hitachi, Samsung, Panasonic, Daikin, O' general, Mitsubishi, Godrej.
09	Geysers / water heaters	Recold, Venus, Usha, Bajaj, Almonard, Standard, Havells, Crompton Greaves, Anchor /Panasonics, Jaquar.
10	MCBs, RCCB, RCBO & MCB, DBs, DBs, Ray roll plug socket	LK, Legrand, GE, Siemens, ABB, Anchor by Panasonic, Schneider,
11	Polycarbonate enclosures IP65/66	Hensel, Cape Electric, Legrand, GE, Siemens, ABB, hager, Schneider, Havells Anchor/ Panasonics,
12	Armored Cables LT / HT XLPE insulated	CCI, KEI, Finolex, KEC, Polycab, Avocab, R.R.Kabel, HPL, BCH, Havells, Anchor by Panasonic, Universal cable, Nicco cable,

13	Cable Lugs, crimping sockets, ferules & accessories	Kamlesh Ind., KSE Electrical, Raychem, Dowells, Jainsons, Ascon (Heavy gauge), ATLAS
14	Brass Gland End Termination	Raychem, 3M, Denson, M-seal, Mahindra & Mahindra, CCI, Dowells. Comet, NMI, Jainsons, ATLAS
15	Cable joint & Termination kit	M-Seal, Raychem, Dowells, Kaycee, inson, Cabseal, Mozfit, 3M, Denson, Mahindra & Mahindra, CCI, RPG. ATLAS
16	GRP / FRP Cable Junction boxes / looping boxes / Cable trays	Sintex, Bravo, Hensel, Cape Electric, Jindal Power Corporation, ERCON, Bajaj Electricals, Satyam Composites or similar.
17	GI Cable Tray & Cable ladder, Overhead & Floor Raceways	Stelco, Steelways, Slotco, Pilco, Patny, Indo Asian, Profab, Emco, Rattan, Supreme, Bravo Cable Trays, KR Power Supply, Copper Line, S.V.M (BJ), Legrand, MEM, OBO or similar.
18	ACB / MCCB (above 125 Amp capacity)	LK, Legrand, Siemens, ABB, Schneider, GE.
19	ACB / MCCB (upto 125 Amp capacity)	LK, Legrand, Siemens, ABB, Schneider, GE,
20	Change Over Switches - Automatic / Manual / ATS	LK, Indoasian, Legrand, Siemens, ABB, Schneider, Cummins, GE,
21	Panel Manufacturer	Manufacturer having own CNC fabrication facility with Polyurethane Gasketing machine and pre-treatment plant, with CPRI approval.
22	Electronic Energy Meter	LK, Siemens, ABB, Legrand, Schneider, Selec, Panasonic, Rishabh.
23	Ammeters, Voltmeters, C.Ts and PTs	Schneider, CGL (Crompton Greaves), Legrand, Panasonic / Anchor, L&T, Siemens, Gilbert & Maxwell, Precise, RDSO / CORE approved make.
24	Pump sets	Kirloskar, CGL, LUBI, KSB pumps, Grundfos, CRI, Mather & Platt, Lubi, Texmo. Make of motor for pump shall be acceptable as per OEM of the pump.
25	Motor Starters	L & T, Indoasian, Legrand, Siemens, ABB, hager, Schneider, CGL, Kirloskar, Anchor / Panasonic,

26	Single Phase Preventers / Relays / Controller Units	LK, Legrand, Siemens, ABB, hager, Schneider, CGL, BCH, Kirloskar, Hitech Controls, Controls, GELCO, Havells.
27	Contactors	L&T, Legrand, Siemens, ABB, Schneider, CGL, GE,
28	PVC Pipe / Column Pipe	Finolex, Supreme, Astral, Ashirwad, Prince, Sudarshan, Precision or Modi, Falcon, Kisan, Dutron.
29	GI / MS pipes	Tata, Jindal, SAIL, Asian.
30	Valves Butterfly, Sluice & Non-Return Valves	C&R, Audco, Castel, Leader, Honeywell, Kirloskar, Zoloto, Crescent, Fouress
31	Vacuum Circuit Breaker VCB / SF6	LK, Siemens, ABB, Schneider, BHEL, CGL, Areva, make or latest RDSO/CORE approved make.
32	Power Capacitors	Shreem, Unistar, Neptune, W S Insulators, Asian Power.
33	Outdoor type heat shrinkable cable termination kit for 11/33 KV cable	CCT, RECHEM, SAFE, COMPAQ or similar approved by Rly/MSEDCL
34	HT/LT cable joints (Straight through/outdoor/indoor)	3M, Denson, G Seal, RAYCHEM, REPL India
35	HDPE Pipe	Tijaria, Himalyan, Koncept,
36	DG Set	Sudhir, Kirloskar, Cummins, Tata, Bharat Bijlee. Ashok Leyland
37	UPS	Numeric Power Systems Ltd, APC
38	Battery	Amara Raja, Exide, CSB, Panasonic, Hitachi, HBL, Amaron, Luminous, Furukawa, Shinkobe, Okaya
39	Surge Suppressor/protector, Spike guard	Havells, LK, Indoasian, Legrand, Siemens, ABB, Schneider, C&S, Anchor/Panasonic.
40	Time Switches, Timers Astronomical & Solid state	LK, Legrand, GE, Siemens, ABB, Schneider, CGL, BCH, Kirloskar, Indo asian, Hitech Controls, Proton Power Controls, Selec, Havells, Anchor/Panasonics,
41	Electric insect killer / Fly Catcher Fitting	Fly, Kill lite, PCI, Wantrn, Wellberg or equivalent.

42	MS Conduit (ISI embossed black namelled/galvanized)	BEC, AKG, NIC, Steel craft, M-Key, SK (E.R.W) orequivalent
44	High Mast	Bajaj, Philips, Crompton, Valmont, Transrail,Wipro, Utkarsh, Ambica Poles
45	G.I. Poles	Bajaj, Philips, Crompton, Valmont, Transrail, Wipro, Utkarsh,Jindal Power Corporation,Skipper, Ambica Poles, Surya
46	Street light pole made of composite GRP/ FRP material	Jindal Power Corporation, ERCON, Bajaj Electricals,Satyam Composites, Sumip Composites or similar.
47	SS Wire Rope	Bharat Wire Rope, Usha Martin.
48	Lightning Arrestor	ABB, Elpro, CamaxIndia, Atlas, Alltec, JMV
49	Bust Duct / Rising Mains	Schneider, Universal, Lecto Egypt, GE, Legrand, Siemens, L&T, C & S, ALFADUCT, Tricolite, Zeta, Anchor.
50	Flex, Venyl for Glow sign boards	LG, 3m, Penaflex, Metamark, Avery
51	Paint	Asian, Nerrolac, Dulex, Shalimar, Berger.
52	Water Coolers	Blue Star, Usha, Sidwal, Voltas
53	Copper Pipe	Hindustan, Merchant, Indigo, Nippon, Supreme, Mandev, Rajco, Nissan, Nippon, Totaline, Maxflow
54	G I Sheets / M S Structure /beam /gurdar / channel	Jindal, SAIL, Essar, Tata, Zenith, Surya, NECO, IPR
55	Acoustic Enclosure	Jakson,Sudhir, Super Nova, Reliable, Equivalent
56	Musical Bell	Anchor by Panasonic / Panama / pointer
57	Refrigerator	LG, Whirlpool, Samsung, Godraj, Voltas
58	DWC Pipe	Finolex Industries, Astral Pipes, Supreme Industries, Ashirvad Pipes, Tirupati Plastomatics, JP Polyplast

END OF DOCUMENT

Special condition

Electrical contractor license:-

Tenderer shall have valid electrical contractor license of appropriate voltage issued by any state govt. Under clause 45 of compilation of rule of Indian Electricity Rules 1956 or as amended from time to time and attested copy of same should be submitted along with the offer.

OR

Tenderer shall associate with an electrical contractor who shall have valid electrical contractor license of appropriate voltage issued by any state govt. Under clause 45 of compilation of rule of Indian Electricity Rules 1956 or as amended from time to time and attested copy of same should be submitted along with the offer.

- The tenderer should give under taking in Case of associate with electrical contractor with valid license in form of MOU of Electrical work on Rs. 300/- Non-Judicial stamp paper duly Notarised as per Annexure -I and who shall be submit the copy of MOU with offer & original should be produced whenever required.
- The tenderer shall submit copy of valid electrical contractor license in both cases & original should be produced whenever required.
- If the tenderer does not submit electrical license and MOU dully notarised, the offer will be considered as incomplete and will be summarily rejected.
- License should be valid throughout the period of execution of work by getting it renewed at suitable intervals and submit an attested copy of same to railway after each renewal. In the event of any discontinuity in the validity of electrical license of the contractor, its authority to work with railways will also automatically cease to be valid. In case any change of association with electrical contractor licensing it could be done only after prior approval of competent authority from railways i.e. Sr. DEE.

Other conditions:-

1. The rates are firm & consolidated and inclusive of all taxes, (**Including GST**), duties, levies including ED, ST on works contract, incidental transport etc.
2. No PVC will be admissible for electrical portion.
3. The Schedule of Rates & Quantities shall be read together with the GCC in vogue and the terms & conditions incorporated in the tender paper.
4. The Quantity shown above is tentative and can increase or decrease according to Railways requirement.
5. Payment terms will be made on the above quoted /accepted rate on account as per execution /measurement & 100% after completion of work in all respect.
6. Before quoting the rate, firm is advised to see the site condition/ other details.
7. Electrical portion of work will be supervised by SSE/Electrical.
8. Maintenance period will be 6 months for all electrical items. However, firm is required to submit contractor/OEM warranty certificate for LED light fittings for 60 months before submission of bill, otherwise bill not forwarded for passing.

MOU- ELECTRICAL WORK

This Memorandum of Understanding (M.O.U) made & entered with this
 (date).....between. (Name of tenderer with address)
 AND
 (Name of Electrical License holder party with address)

This indenture witnessed as follows:

Whereas (Name of tenderer) has a considerable experience in Civil work like
 as (Building, drainage etc.)

Whereas (Name of Electrical License holder party) contained considerable
 experience in Electrical works.

And whereas Divisional Engineer (W) Bhavnagar OF WESTERN RAILWAY OF INDIA, as have
 invite Tender for (Name of work) in connection with Sanctioned work.

And where as in response to above tender invite by WESTERN RAILWAY OF INDIA, both the
 party have expressed their desire to from consortium to submit competitive bid & execute this work
 in the event of award of this contract to (Name of tenderer) by WESTERN
 RAILWAY OF INDIA, the intend being that (Name of tenderer) will act as the
 prime bidder and (Name of Electrical License holder party) will participate as a
 associate of (Name of tenderer)..... .

And where the purpose of present understanding is to set out the relation between the parties both
 during tendering and negotiation phase and also during the phase of execution of work on the basis
 of term and condition mutually agreed upon between the two parties.

And whereas parties agree to convert this memorandum of understanding in to formal agreement in
 due course of time incorporating the details of terms & condition etc. as mutually agreed upon.

The parties further agree as follows:

The nature of MOU is that of temporary working arrangement for the purpose of submission of bid
 as well as subsequent execution of work as per the respective scope work spelt out here after.

Signature of (tenderer)

with seal

Place:

Date:

Signature of (Electrical License holder party)

with seal