



# **DEENDAYAL PORT AUTHORITY**

(Erstwhile Deendayal/Kandla Port Trust)  
Ministry of Ports, Shipping & Waterways, Govt. of India  
Mechanical Engineering Department



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No.: EL/AC/2908

Date: 05/03/2026

## **EXPRESSION OF INTEREST [EOI]**

**Design, supply, installation, testing & commissioning of 30 Meter Height High Mast Tower for 50.95 & 35 Hector newly developed custom bounded area at Deendayal Port Authority.**

(This EOI is issued to elicit Expression of Interest from the parties interested in the work and does not constitute any binding commitment from the Deendayal Port Authority to proceed with the work or invite any or all the parties in the subsequent bidding process. (The Open Tenders will be issued subsequently.)

Executive Engineer (Electrical), DPA invites Expression of Interest for the work of "Design supply installation testing & commissioning of 30 Meter Height High Mast Tower for 50.96 & 35 Hector newly developed custom bounded area at Deendayal Port Authority" from the reputed firms from those who have executed similar work in Government / Public Sector and other leading private organizations. The Expression of Interest (EOI) documents containing details of Scope of Work and Technical Specifications are enclosed herewith.

The interested firms are requested to submit their Expression of Interest (EOI) for the said work in BOQ format as enclosed along with EOI, firm shall submit the credential, Electrical Licenses etc. if any query in Technical specification & BOQ same shall be required to submit along EOI offer. The EOI shall be submitted to the office of the undersigned on or before 23/03/2026. A soft copy of EOI is also acceptable through e-mail Id [deepak.hazra@deendayalport.gov.in](mailto:deepak.hazra@deendayalport.gov.in) & [anil.rautiya@deendayalport.gov.in](mailto:anil.rautiya@deendayalport.gov.in)

**Sd/-**  
**Executive Engineer (E)**  
**Deendayal Port Authority**

## Bill of Quantity

**Name of Work:** Design supply installation testing & commissioning of 30 Meter Height High Mast Tower for 50.95 & 35 Hector newly developed custom bounded area at Deendayal port Authority.

Item No.	Description	Qty.	Unit	Rate	Amount
<b>Part A: Area Lighting for 50.95 &amp; 35 Hector Area</b>					
1	Design, Engineering, Supply, Fabrication, Transportation, Insurance, including structural design, Erection, Testing & Commissioning of 30 Meter High Mast Towers, having Double Drum winch , lowering rising mechanism, illumination design for maintaining of minimum 35 Lux by using 470-500 (+/- 5%) Watt LED flood lights with IOT enables smart lighting control system complete in all respects, considering 0.70 Maintenance Factor and uniformity of 0.60 for a 10m x 10m grid in the 50.95 & 35 hector area , the work include with required Pile foundation, Soil Testing and ancillary works consisting of the IOT based feeder panel for clustering & protection system, cables, GI fabricated protection guard, Earthing etc. complete in all respects as directed. The IOT enabled smart lighting system shall work in the form of cluster with Dashboard, monitoring control system, communication system etc. and shall be provided with the cyber security and shall work with the SCADA. The High Mast Towers & LEDs shall comply with the specifications, mentioned in the Scope.	Lump Sump	Complete Job		
Total Amount of Part-A (Rs.) (Excl. of GST)					
<b>Part B: Electrical Infrastructure</b>					
1	Supply at Site of 11/0.433 KV outdoor type Compact Substation having dry type transformer of 630 KVA capacity and as per the Tech. Specification No.1	3	Nos.		

2	Installation, testing & Commissioning, which includes required Civil foundation & cable duct as per the OEMs design of 11/0.433 KV, 630 KVA Compact Substation and as per the Tech. Specification No. 2	3	Nos.		
3	Supply at site of 3 core, 150 Sq. mm (U/E) HT armored aluminum conductor XLPE cable of 11kV grade as per IS: 7098 (Part – II) 1988 & as per the Technical Specification No. 3	5800	m		
4	Supply at site of 4 Core, LT armored aluminum conductor XLPE cable of 1.1kV grade of following type & size as the per Technical Specification No.4				
a	300 Sq.mm	4500	m		
b	150 Sq.mm	6500	m		
c	50 Sq.mm	16000	m		
5	Laying of 3 core 150sq.mm HT XLPE cable at various route as under as per the Technical Specification No.5				
a	Through HDD by providing & laying cable in HDPE pipe (I.D. 6" & wall thickness 12mm) in Railway / road /RCC/culvert etc.	1500	m		
b	Providing & laying of HDPE pipe (I.D. 6" & wall thickness 12mm) in hard & soft soil through excavation.	3000	m		
c	RCC Trench	1300	m		
6	Laying of LT armored aluminum conductor XLPE cable of 1.1kV grade 4 core, 300 Sq.mm through following type as per the Technical Specification No.6				
a	Through HDD by providing & laying cable in HDPE ( I.D. 6" & wall thickness 12mm) pipe in Railway / road /RCC/culvert etc.	1000	m		
b	Providing & laying of HDPE pipe (I.D. 6" & wall thickness 12mm) in hard & soft soil by excavation.	3500	m		
7	Laying of LT armored aluminum conductor XLPE cable of 1.1kV grade 4 core, 150 Sq.mm through following type as per the Technical Specification No.7				

a	Through HDD by providing & laying cable in HDPE ( I.D. 6'' & wall thickness 12mm) pipe in Railway / road /RCC/culvert etc.	2500	m		
b	Providing & laying in HDPE pipe (I.D. 6'' & wall thickness 12mm) in hard & soft soil by excavation.	4000	m		
8	Laying of LT armored aluminum conductor XLPE cable of 1.1kV grade 4 core, 50 Sq.mm through following type as per the Technical Specification No. 8				
a	Through HDD by providing & laying cable in HDPE pipe ( I.D. 6'' & wall thickness 12mm) in Railway / road /RCC	2500	m		
b	Providing & laying of HDPE pipe (I.D. 6'' & wall thickness 12mm) in hard & soft soil by excavation.	13500	m		
9	Supply at site following type of LT panel as per Technical Specification No.9				
a	Main Load Point Panel,	6	Nos.		
b	Sub Load Point Panel,	12	Nos.		
10	Installation, Testing & Commissioning of following type of LT panel as per Technical Specification No.10				
a	Main Load Point Panel,	6	Nos.		
b	Sub Load Point Panel,	12	Nos.		
11	Supply & Fixing of the HT indoor type end termination heat shrinkable kit suitable for cable size 3C x 150 sq.mm HT XLPE cable as per the Technical specification No.11	14	Nos.		
12	Supply & Fixing of the HT Heat Shrinkable Straight Joint kit suitable for cable size 3C x 150 sq.mm HT XLPE cable as per the Technical specification No.12	12	Nos.		
13	Preparation of earthing system with chemical electrode & back fill compound as per the Technical Specification No. 13				
a	GI 80mm diameter, 3m electrode	40	Nos.		
14	Preparation of earthing system with copper chemical electrode & back fill compound for CSS earthing as per the Technical Specification No. 14	6	Nos.		
15	Supply, Laying, connecting with	50	m		

	continue Copper Strip of 50×6 mm size between earth station to the neutral of the Transformer as per the Technical Specification No.15				
16	Supply, Laying, connecting of GI Strip of following size connecting earth station to the equipment as per the Technical Specification No. 16				
a	50 x 6 mm	1500	m		
17	<p>Providing, laying and fixing in position design mix reinforced cement controlled concrete for RCC Precast chamber of design mix M-30 grade, using cement content as per approved design mix, including placing of pre-cast chamber to site of laying including the cost of centering, shuttering, finishing , admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per the direction of the Engineer-in-charge. (Rate is inclusive of cost of necessary reinforcement)</p> <p>(A) Pre-cast RCC M-30 chamber of inner size 900 X 750 X 1200 mm. with wall thickness of 150 mm and top cover of 100 mm thick with 10mm dia reinforcement at 150 mm c/c single jalli in both direction including providing necessary openings/ hole for passing cables. (As per the drawing attached)</p>	2000	Nos.		
Total Amount of Part-B (Rs.) (Excl. of GST)					
<b>Total of Part A &amp; Part B:</b>					
<p>(In words Rupees _____ only)</p> <p><b>(NOTE: The rates should be inclusive of all taxes, duties, fees, cess etc and all incidental charges; but exclusive of GST).</b></p> <p style="text-align: center;"><b>Sd/-</b></p> <p><b>Signature &amp; Seal of Contractor</b> <span style="float: right;"><b>Executive Engineer (E)</b> <b>Deendayal Port Authority</b></span></p>					

## Scope of Work

1. The Deendayal Port Authority (DPA) is one of the Major Ports in India. The Specification is intended to provide illumination through 30m Height High Mast lighting towers on EPC. The through contractor shall read carefully the tender condition & technical specification & site visit mandatory to familiar the site condition and acknowledge the site work.
  
2. **Part A** of schedule B is on EPC mode , Bidder shall Design, Engineering, Supply, Fabrication, Transportation, Insurance, including structural design, Erection, Testing & Commissioning of 30 Meter High Mast towers, having Double Drum winch , lowering rising mechanism, illumination design using approved software with supply of required 470-500 Watt (+/-5 %) LED flood lights, Lighting System with IOT enables smart lighting control system complete in all respects to maintaining Minimum illumination level 35 Lux considering 0.70 Maintenance Factor and uniformity 0.60 for a 10m x 10m grid over 50.95 & 35 Hectare areas ,which includes Complete Civil work with required pile foundation and its ancillary works.
  - 2.1 The contractor is advised to inspect & survey the site for assessment and clear understanding for the requirements. DPA will not entertain any claims in this regard. contractor shall be responsible to Design, Engineering, Supply, Fabrication, Transportation, Insurance, including structural design, Erection, Testing & Commissioning of 30-Meter-High Mast towers after due considering the climatic conditions and saline environment prevailing at Deendayal Port site.
  - 2.2 The broad scope of Engineering, Procurement and Construction (EPC) for Part-A “Design supply installation testing & commissioning of 30 Meter Height High Mast Tower for 50.95 & 35 Hector newly developed custom bounded areas on EPC Mode at Deendayal port Authority” the scope which includes but not limited, contractor shall be responsible to complete all the work within stipulated period.
  - 2.3 The scope covers, IOT enabled feeder pillars panel for High Mast Power supply & protection system, EPR High Mast cabling, GI fabricated protection guard, Earthing.
  - 2.4 The contractor shall design and provide suitable PILE foundation for high mast system as per the SBC Test, SBC test is in the scope of contractor. The contractor shall take approval for design of high mast foundation from any Indian Institute of Technology or any Government approved Laboratory of University of Gujarat state, same should be submitted to Civil Engineering Department for the Technical Vetting.
  - 2.5 Before commencing any civil work, such as excavation, breaking of RCC/CC, crossing of road/railway and high mast foundation, permission shall be taken from Civil Engineering Department, DPA. However, depending on the nature & quantum of work, the contractor shall deposit the requisite amount as directed before taking permission and the deposited amount will be refunded after inspection & giving clearance by DPA. Proper curing of all the civil works shall be done as directed by Civil Engineering Department. The high mast foundation work shall be executed under supervision of Civil Engineering Department.
  - 2.6 The scope includes Design, supply, erection, Testing & commissioning of IOT enabled smart lighting control panel facilitate with communication system, control feature, monitoring feature, dashboard, cyber security and system shall be capable of integration with SCADA.
  - 2.7 The civil works shall be executed by the Civil Department of DPA. However, the contractor shall be responsible for providing all engineering details, including any revisions, design, and drawings required for the civil and structural works necessary for the successful installation and commissioning of the plant.

- 2.8** All the panel shall be of Minimum IP -66 and outdoor type. Also all the material shall be selected in such a way to work successfully in the highly dusty, moisture & corrosive environment prevailing at Kandla.
- 2.9** For LAN connectivity the requirement OFC shall be supplied, laid & connectivity by the contractor at their own cost to the network switches allowed by DPA.
- 3. Part-B** contained, Electrical Infrastructure for newly developed area, the work envisages supply installation, Testing & commissioning of the 630 KVA Capacity 11/0.433 KV CSS, Main Load point panels, Sub Load sub point panels, supply & laying assorted rating HT & LT cable for High Mast lighting towers, 11 KV power tapping from existing Substation.
- 3.1** The scope includes, Supply, laying & end termination of 11KV XLPE Power Cable and Supply, laying & end termination of 1.1kV XLPE Power Cable.
- 3.2** Contractor shall arrange the 11 kV power supply at the 35-hectare and 50.95 hectares to cater the entire load of High Mast towers (30 meters). All necessary electrical infrastructure downstream of the 11 kV power line shall be within the scope of the contractor. Earthing strips shall be provided by contractor for earthing and lightning protection conductors (Main Earth Loop / Down Conductors). The earth pit shall be of chemical type, pipe-in-pipe electrode type, ensuring maintenance-free operation and long durability. As per the plant requirements, lightning arresters shall be supplied and erected to provide complete protection of the plant against lightning strikes. Additional earthing, if required, shall also be provided. It can also make it in full IS-3043 and IEC standard tender format (with earth resistance values like  $\leq 1$  ohm for high mast).
- 3.3** The contractor shall be solely responsible for transporting all equipment, materials, and machinery at his own cost, with proper packaging and handling. The contractor shall also arrange and obtain all necessary permissions, permits, consents, and licenses. All equipment shall be suitably protected, coated, covered, or boxed and properly packed to prevent damage or deterioration during transit, handling, and storage at the site until the time of erection. The contractor shall be fully responsible for any loss or damage occurring during transportation, handling, storage, installation, and commissioning of the High mast tower equipment's.
- 3.4** The contractor shall arrange the Hydraulic Mobile / Truck Mounted Crane of required Capacity for Installation of 30Meter High Mast Towers.
- 3.5** The sign board shall be posted at the appropriate place in the High mast Tower light indicating the prohibited area, Danger zone, and etc. for safe operation and working demarcations.
- 3.6** Contractor at site at their cost, shall arrange for all the consumables, tools & tackles, equipment's, materials, manpower, testing & certification for requirement for high mast towers & its allied accessories/equipment, lodging, fooding, transportation for their employees & material, temporary site office/containers/shelters/portable bio toilets at site, instruments, safety requirements, legal & statutory requirements, insurances. Arrangement for storing the materials, tools etc. will also have to be arranged by the contractor. The DPA shall not be responsible for any theft/loss of any materials, tools, etc. stored/brought by the contractor for execution of work.
- 3.7** In case of any damage arising out of negligence, ignorance, mala fide intention of the Contractor the same shall be made good at the cost of contractor including the cost of material/spares within a reasonable period of time acceptable to DPA, failing which the cost of the damages assessed by DPA shall be deducted from the bill of the Contractor.
- 3.8** Contractor shall keep the site reasonably clean during the execution of the work and from all unnecessary obstruction, store or remove any surplus materials like wreckage, rubbish or temporary works shall be removed from at the site along with the equipment no longer required.

After completion of the work the contractor shall hand over which are the clear site devoid of all debris, unused material etc. to the satisfaction of DPA.

- 3.9 The contractor shall carry out the necessary Field Test of all High Mast Towers in the presence of DPA & TPIA.
- 3.10 In case of any hindrance while erection of any of the High Mast Tower in any location as per the design the same shall be shifted to the nearby position without compromise with the other design criteria while execution of the work, the work site shall be properly cordoned and also reflecting type radium tape should be used.
- 4. The locations of High Mast Lighting Towers shall be shown in the drawing and 5 copies to be submitted to DPA. However, the exact location of the high masts is subject to minor change depending on the actual site condition only at 50.95 & 35 Hectare area and the same will be decided by the Engineer-in-Charge, DPA and decision of the Engineer-in-Charge shall be final & binding on the contractor.

**1) APPLICABLE STANDARDS High Mast:**

The High mast shall be of continuously tapered, polygonal cross section, at least 20 sided, presenting a good and pleasing appearance and shall be based on proven In-Tension design conforming to the standards referred to above, to give an assured performance, and reliable service. The high mast structure with luminaries etc. all fixed and lantern carriage shall be capable of withstanding the external forces exerted on it by wind speed as specified in IS 875, part 3, 2015 with an adequate load factor. Essentially mast should be capable of withstanding the 3-second gust of 55 m/sec. The factor of safety for wind load shall be 1.25 and for other loads 1.15 considering Seismic Zone VI.

The following shall be the Reference Standards for the loading of the High mast:

Code No.	Title
IS 875 (Part III) 2015	Code of practice for Design loads (other than earth quake) D for building and structure
IS 1893	Criteria for Earthquake resistant design of structure
BSEN 10025	Grades of MS Plates (Gr – S 355) for shaft
IS 2062	Base Plate (Grade E 350)
EN 8	Foundation bolt
BS ISO 1461 , IS 4759	Galvanizing
TR No. 7 2000 of ILE, UK	Structural calculation
BS 5135 or IS 9595	Welding
IS 3043	Code of practice for Earthing

**2) Applicable standard for LED Flood Light:**

The technical specification of 470-500 (±5%) Watt energy efficient LED flood light (with optical lens) suitable for 30m High Mast tower is as below:

Technical Requirement for LED 470-500 Watt, Warm white fixture:		
SR.NO.	DESCRIPTION	SPECIFICATIONS

1	Input Power	470W-500 W +/- 5%
2	Input voltage AC	120-270 V AC
3	Input Frequency	50 Hz +/-1 HZ
4	Life	50,000 burning hours @ L70B50 @ 35 Degree Celsius.
5	Inter-changeability	Suitable for mounting on lattice towers / Lantern carriage of High Mast.
6	Total Harmonic Distortion	<10% maximum
7	Working Temperature	-10°C to +45°C
8	Working Humidity	10% to 90% RH
9	Temperature	3000 K
10	Colour rendering index	>70
11	Lumens / Watt	110 Lum/W at System Level
12	Finishing	Corrosion resistant powder coating
13	Power factor	Not less than 0.95
14	Forward current	The forward current of LED shall be $\leq$ 70% of the rated forward current of LED.
15	Warranty	5 Years from the date of successful commissioning. It is clarified that during Warranty Period, if the material is found to be defective or has poor performance or has lumen depreciation beyond permissible limit as per LM80 report, the Supplier shall promptly, Replace the material against manufacturing defects /Rectify the material, on receiving the instruction from Engineer-in-Charge, At the contractor cost. The contractor shall have final & single point responsible for performance of the LED Light fitting supplied.
16	Construction	The housing should be of single piece non-corrosive Matt gray powder coated pressure die-cast aluminum frame with heat resistant toughened clear glass fixed with SS screw. Optical and control gear compartments shall be maintainable/replaceable without impacting the LED units. The access to the optical and the gear compartment should be separate. While accessing the gear compartment, the optical compartment should not be accessible.
17	Surge Protection	The Luminaire should have a 10kV SPD duly bolted inside the Luminaire. The SPD should be able to sustain a minimum 15 hits of 10kA rating i.e. Total of 45 hits across all the three modes as per IEC 61000.
18	Electrical Protection	The Luminaire should be capable of withstanding voltage stress of 440V phase to phase for 8 hrs at 50 degree Celsius and should have low voltage protection as 100V for 48 hours & high voltage cut-off above 325 VAC and should have an auto restart

		feature.
19	Impact Resistance	IK08
20	Driver Construction	<p>The Drivers should be a potted driver not a printed circuit board without casing, mounted inside the luminaire.</p> <p>The Driver shall be of constant current type and shall have Over voltage, Over current, Over temperature &amp; Short circuit Protection.</p> <p>The driver efficiency shall be more than 85%.</p> <p>List of make of Driver: PHILLIPS Xitanium/ MEANWELL/ OSRAM/ BAG/ SOSEN/ INVENTRONICS.</p> <p>Manufacturers can use their own make LED driver and the LED Driver shall be BIS certified and shall meet the specifications and comply with Safety requirements (IEC 61347-1, IEC 61347-2-13), EMC requirements (CISPR 15/ EN 55015, IEC/EN 61547, IEC/EN 61000-3-2, IEC/EN 61000-3-3).</p>
21	Driver IP protection	IP 66 or more
22	Driver shall safety compliance	As per IEC IEC61347-1/ IS 15885 (Part2/ SEC13)
23	Ingress Protection Level of Luminaire	IP66 or More
24	Optics	As per the design submitted in Bid
25	Material of optics	<p>PC lens with toughened glass cover. The LEDs should be provided with UV resistant lens/glass cover for avoiding yellowing of the lense/glass cover.</p> <p>Or Exposed lensed PC Lens plate, the LEDs should be provided with anti-dust, UV resistant exposed lens for avoiding any dust &amp; dirt accumulation on the fixtures and yellowing of the lenses.</p>
26	Makes of LEDs	Lumileds, Osram, Nichia and CREE & no other make.
27	Specification of LED	SMD type with wattage of each LED should be greater than 1 watt and less than 3 watts. Only high power Single LED chip with ceramic based suitable for outdoor use is allowed. Multi Chip, array multi die, mid power, Integrated arrays and COB's are not permitted.
28	Supporting Clamp	Supporting clamp of fitting should be of minimum 4mm thick with 360 degree rotatable.
29	Certification preferred/essential	<p>(1) Type test reports for LED Flood Light Fitting &amp; LED Driver.</p> <p>(2) The luminaire should be tested as per IEC 60598 standards and following test reports should be submitted: Thermal Test, Ingress Protection Test, Electrical / Insulation Resistance Test,</p>

Endurance Test, Humidity Test. The luminaire should be tested for 'Drop test' as per IEC 60068- 2-31/IS9000 Part 7 / Sec 3 standards. The luminaire should be tested for 'Vibration test' as per ANSI/IEC 68-2-6 standards.

(3) Should comply to IESNA LM-79 (Approved method for the Electrical and Photometric Measurements of Solid-State Lighting Products). LM79 report from any NABL accredited laboratory.

(4) The LEDs used should comply to LM-80 standards (IESNA: Approved Method for Measuring Lumen Maintenance of LED Light Sources and LED lumen depreciation time to L70 based on LM-80 data).

(5) The LEDs shall comply with photo biological safety norms as per IEC 62471/EN 62471/IS: 16108 under Risk Group 1 (Low Risk).

(6) BIS Certificate for LED Driver.

(7) BIS Certificate for LED Luminaire.

Contractor shall submit all the above certificate/report including BIS certificate for the Luminaire at the time of supply of fitting (The bidder shall submit LM79 report(s) of the offered LED flood light fitting issued by ERDA).

LM79 report shall be submitted from NABL accredited LAB.

The contractor shall take prior approval from the Engineer in charge for make of LED fixture. List of make of LED luminaire: Bajaj/ Philips/ CG/ C&S/ SYSKA/ WIPRO/ Pyrotech/Neri/Surya/Nessa/Panasonic

**Signature & Seal  
of Contractor**

**Sd/-  
Executive Engineer  
Deendayal Port Authority**

## TECHNICAL SPECIFICATIONS FOR PART-B

### Technical Specification No. 1:

The works include 630 KVA outdoor type compact Substation hermitically sealed along with metering system, the CSS consist Ring main unit configuration shall NON extensible Compact Switchgear consist of One VCB as a I/c (+) One out going feeder VCB shall be electrically operated (+) One transformer circuit breaker (TCB). Each VCB Circuit breaker facilitate with Isolator & earth switch in RMU panel all shall be non-draw out type in fixed position. Breakers and load switches shall be SF6 gas or Vacuum type (with Isolator & earth Switch). Make of CSS: - ABB/SIEMENS /Schneider.

The following salient features & standard must be adhering for 630 KVA CSS.

1. Standard: - As per IEC: - 62271-202.
2. CSS Degree of Protection
  - a. HV compartment: - IP 54.
  - b. LV compartment: - IP 54.
  - c. Transformer compartment: - IP23D.
  - d. For stainless steel SF-6 tank :-IP 67.
  - e. For switchgear: - IP 2X.
3. Enclosure Thickness: - 2mm Thick GI.
4. Base Frame of HRCA Hot Dip Galvanized & 4mm Thickness.
5. Transformer Compartment Roof is detachable type, so that whenever Transformer require to remove from compartment it is possible without disturbing HV & LV Compartment.
6. Paint thickness: - Minimum 160 Micron (Duplex Powder coating).
7. Bus Bar Insulation Gas: - SF6.
8. Nominal operating Gas pressure: - 1.4 Bar @20-degree C.
9. Bus Bar Material: - CU.
10. Paint shade: - RAL 7035.
11. Main Bus Bar: - 240 sq.mm Copper for HV.
12. Earth Bus Bar: - 120 sq.mm copper HV.
13. CSS is internal Arc Type Tested for 21 KA for 1 sec. as per IC: -62271-202.

#### **RMU Construction.**

- RMU panel construction shall be metal enclosed framed compartmentalized panel construction with hermitically sealed. Consisting of 4 no's lifting lugs & cable entry from bottom. The cable gland plate shall be made form 3 mm metallic removable type & split type in two parts.
- The bus bar rating 630 Amps. (Copper), with supported by insulator made from SMC resin type. The earth bus bar shall be of copper suitable for rated fault duty for 1 sec and earth bus internal connection to all non-current metal parts by 2.5sq mm copper flexible wire.
- Hardware's should be used of high quality Stainless steel except termination nut-bolts which should be high Grade Stainless Steel.
- Make of vacuum Interrupter & Make of RMU should be same manufacturer.

a). VCB with Load Break Switch (ISOLATER & Earth Switch)

a)	Type	Three pole operated simultaneously by a common shaft, VCB with (ISOLATOR & Earth Switch) and fault making in SF6 tank
b)	No of phase	3
c)	Arc interruption in dielectric medium	Vacuum
	Type of Charging, Mechanism:	Manual (spring assisted) as well as motorized with 24 V DC operated motor.
d)	Rated Current	630Amps
e)	Rated Breaking Capacity	630Amps
f)	Fault making Capacity	52.5KA Peak
g)	Short time current for 3 sec	21KA
g)	No of poles	3
i)	Current transformer	3 nos. epoxy cast Current Transformers with 2.5 VA burden STR of 21 KA for 3 second metering accuracy Class 0.5 and protection accuracy 10P10 and having of CTR 150/75- 1A.
k)	Protection Relay	Numeric type or latest updated version (Make: ABB/SIEMENS) with the protection of inverse, definite time, short circuit, over current, instantaneous and earth fault, master trip and trip supervision.
l)	Metering Compartment	Multi-Function meter having digital type (single) with voltage, current, PF, frequency, KW and KWH (Make – ENCRON/L&T / Conzerv) with Mod Bus RS-485.
m)	Operating Mechanism	One no. shunt trip and tripping coil operating on 24 V DC. 2 nos. of space heater with ON/OFF switch and thermostat in each side of panel & Cable chamber.
n)	Protection system:	Relay must be Numeric type with following features: a) Self-Powered OC+EF Protection Relay b) Control voltage, 24 V DC c) Interference RS-485 port d) Instantaneous Over Current e) short Circuit protection, Inst. Earth fault (50,51,50N & 51N) Instantaneous definite time & inverse type protection of over current.
p)		Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
q)		Capacitive voltage indication fixed type
r)	Battery & Charger	2x 12 Volt DC, battery & Battery charger to be supplied along RMU.

The 2 no's of VCB with isolators & earth switch unit are for receiving of 2 No's Incoming 11 KV 3C x 150 Sq.mm XLPE cable from sub-stations/LILO and also with mechanical & Electrical interlocking between them so that one incomer may be taken on load and another will remain in standby position.

**b). TRANSFORMER CIRCUIT BREAKER.**

a)	Type	Three pole operated simultaneously by a common shaft , VCB with (ISOLATER & Earth Switch) and fault making in SF6 tank
b)	No of phase	3
c)	Arc interruption in dielectric medium	Vacuum
d)	Type of Charging, Mechanism:	Manual (spring assisted) as well as motorized with 24 V DC operated motor.
e)	Ratted Current	630Amps
f)	Rated Breaking Capacity	630Amps
g)	Fault making Capacity	52.5KA Peak
h)	Short time current for 3 sec	21KA
i)	No of poles	3
j)	Current transformer	3 nos. epoxy cast Current Transformers with 2.5 VA burden STR of 21 KA for 3 second metering accuracy Class 0.5 and protection accuracy 10P10 and having of CTR 100-50/ 1A.
k)	Protection Relay	Numeric type or latest updated version (Make: ABB/SIEMENS) with the protection of inverse, definite time, short circuit, over current, instantaneous and earth fault, master trip and trip supervision.
l)	Metering Compartment	Multi-Function meter having digital type (single) with voltage, current, PF, frequency, KW and KWH (Make – ENCRON/L&T / Conzerv) with Mod Bus RS-485.
m)	Operating Mechanism	One no. shunt trip and tripping coil operating on 24 V DC. 2 nos. of space heater with ON/OFF switch and thermostat in each side of panel & Cable chamber.
n)	Protection system:	Relay must be Numeric type with following features: <ul style="list-style-type: none"> <li>a) Self-Powered OC+EF Protection Relay</li> <li>b) Control voltage, 24 V DC</li> <li>c) Interference RS-485 port</li> <li>d) Instantaneous Over Current</li> <li>e) short Circuit protection, Inst. Earth fault (50,51,50N &amp; 51N)</li> </ul> Instantaneous definite time & inverse type Protection of over current.

p)	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
q)	Capacitive voltage indication fixed type

The SF-6 breaker shall be completed with necessary interconnection with fine wiring, ferruled properly including foundation bolts, earthing etc. The layout drawing, dimensional drawings and electrical wiring diagram and operation & maintenance manuals shall be supplied with SF-6 Breaker. The SF-6 breaker shall be supplied in conformity with relevant ISS i.e. with up to date amendments along with manufacturers test certificate.

**c) TRANSFORMER:**

The transformer shall be fully tested for routine tests, as per BIS-1985. This specification covers the requirements of design, manufacture, testing and supply of cast resin dry type transformers complete with all the accessories and fittings for efficient and trouble-free operation. The equipment covered by this specification shall, unless Otherwise stated to be designed, constructed and tested in accordance with latest revisions of relevant Indian standards / IEC publications. All transformers shall be of the latest design, dry type Cast Resin only. The type of cooling shall be Natural Air cooled (AN) and the corresponding ratings for each transformer. The transformers shall be designed to be capable of with-standing, without injury, the thermal and mechanical effects of short-circuits between phases or between phase and earth at the terminals of any winding with full voltage applied across the other winding for periods given in relevant standards. The transformer shall be capable of continuous operation at full load rating under the following conditions. a) Voltage variation =  $\pm 10\%$  b) Frequency variation =  $\pm 5\%$  c) Combined voltage and frequency variation (Absolute sum) = 5%. All Routine Tests in accordance with IEC 60076 / IS 2026 shall be carried out on each transformer.

Core: - The double wound Core shall be constructed from non-ageing cold rolled Grain oriented steel sheets. The built core shall be painted with high temperature resistant paint to prevent corrosion at the edges of core plates and to withstand high temperatures. By using different core material optimization of core losses shall be achieved. The yokes shall be firmly clamped between yoke channels or plates. The top & bottom yoke frames shall be secured to each other by means of tie-rods, which help in securing the winding in place.

WINDINGS: - Resin Casted both Windings (HV & LV) shall be of electrolytic copper conductors (circular in shape) of high conductivity and 99.9% purity. Windings shall be designed to withstand the specified thermal and dynamic short circuit stresses. The windings shall be duly sectionalized. Accessible joints brazed or welded and finished smooth shall connect similar sections. No corona discharge shall result on the winding upon testing the transformer for induced voltage test as specified in IS. The end turns of the high voltage windings shall have reinforced insulation to take care of the voltage surges likely to occur during switching or any other abnormal condition. The high voltage and low voltage winding are shall be made of copper Conductors. HV winding will be always be resin casted under vacuum while LV winding can either be casted or pre-impregnated with resin.

The tenderer shall furnish details regarding adequacy DIN of Transformer capacity.

a)	Transformer capacity	630 KVA (DRY TYPE) Three Phase, 50 Hz, Core type, two winding, Cast Resin Dry type Transformer
b)	Primary voltage	11 KV +/- 10%
c)	Frequency	50 HZ
d)	No. of Phases	3
e)	Insulation Class	'H'
f)	Cooling	Natural Air
g)	Temperature	Max 115 C by RTD
h)	Percentage Rise	As per IS
i)	In winding	115 degree C, Over ambient temp. of 50 degree
j)	Winding connection	Star/Delta
k)	Impedance	4.5 ( Tolerance as per IS)
l)	Vector Group	Dyn 11
m)	Neutral Grounding	HV ungrounded LV Solidly Grounded
n)	Winding material	Copper
o)	Noise Level	As per NEEMA Standard
p)	Tapping Range (HV Side)	-10 % & + 5% in steps of 2.5 % , off circuit tap links
q)	Painting	632 Shed of IS:5 or BIS/DIN Standard
r)	Tapping Range	+/- 5%
s)	Losses (No Load & Full load )	As per IS:-2026
t)	Make	Voltamp/Hitachi/Siemens/Schneider
u)	Fittings	2 Numbers Earthing Terminals, Rating and Diagram Plate, Lifting Lugs, Winding Digital Temp. Scanner with RTD.
v)	Losses	AS Per IS-2026. No load: - 1600 Watt. Load losses at 75-degree C: - 6400 Watt. (Maximum)

Contractor shall facilitate for following stage inspection:

- [1] Core assembly of transformers,
- [2] Final testing in accordance with IS: 2026 and as per Technical Specification, approved drawing & QAP.

Contractor shall furnish the following documents in regards of procurement of core material at the time of inspection & before dispatch clearance.

- a. Invoice of supplier.
- b. Packing list.
- c. Raw Material Test Certificate as per BOM.

Description of material, Electrical analysis, physical inspection certificate for surface defects, thickness & width of material.

- d. LV SWITCHGEAR.

The L.V side should be designed to equip the following: -

Low voltage Bus bar system

The equipment shall have all the following features -

a)	LV bus bar	From transformer LV bushing to ACB and from ACB to MCCBs
b)	Bus bar size for phase & neutral	Tinned copper busbar, size shall be as per manufacturer design. All the phases and neutral busbar shall be same rating & size. Bus bar size for phase & neutral Suitable spreader to be provided at outgoing side of MCCB to connect 300 sqmm cable through aluminium lug.
c)	Bus bar support	By epoxy insulators
d)	Bus bar sleeve	insulation Color coded
e)	Bus bar rated current	Suitable for 1250 A continuous current rating within the 10K class enclosure @ 50 Degree C ambient temp
f)	Bus bar short circuit	withstand 50 kA for 1 sec

- e. Low voltage switchgear, ACB. - 1250 amp. 4P, 50 KA – Electrically operated manually draw out Type (EDO) ACB.

The equipment shall have all the following features -

a)	Rated operational voltage (V) at 50 Hz	440V
b)	Rated frequency (Hz)	50Hz
c)	Current rating Amps (rms)	1250 Amps
d)	Rated insulation voltage (V) at 50 Hz	690 Volt
e)	Number of poles	4
f)	Rated impulse withstand voltage(kV)	8
g)	Rated Ultimate Short circuit breaking capacity at 415 V, 50 Hz ( kA rms) Icu	50
h)	Rated Service Short circuit breaking capacity at 415 V,50 Hz ( kA rms), Ics	50
i)	Rated short circuit making capacity at 50Hz (kA peak), expressed as multiples of Icu	105
j)	Rated short time withstand current for 1 sec at 50 Hz (kA rms), Icw, expressed as percentage of Icu	50
k)	Category of utilization	B
l)	Shutters on 'Trip' & 'Close' push button with sealing facility	Yes
m)	Accessory mounting	Accessories shall be front accessible plug in type. Accessories namely motor shunt trip & closing coil, UVT etc. should be common for the entire range & shall be suitable for both AC & DC voltages.
n)	Operating mechanism	Spring charging stored energy type, manual & motorized.
o)	Mechanical life (Operating cycles)	20000

p)	Indications	Breaker shall have following mechanical indications: 1. ON, 2. OFF, 3. TRIP 4. SPRING CHARGE STATUS
q)	Sensing	True RMS based
r)	Type	Microprocessor based
s)	Control Terminal	Should be front accessible and minimum NO/NC contacts shall be provided for electrical interlocking.
t)	Protection	Overload protection Pick up 0.4 to 1.0 mA Time delay 0.2 to 40 sec Short Circuit Pick up 2 to 10 mA Time delay 20 to 400 Micro sec Instantaneous Over current Pick up 4 to 16 mA & OFF Earth Fault Pick up 0.2 to 0.6 mA & OFF Time delay 100 to 400 msec
u)	Metering required	Multi-Function meter for measuring 3 Ph current, 3 Ph Voltage, KWH, KVAH, Power Factor, Max Demand (KVA), communication Protocol :- Mode Bus RS 485.
v)	Indication	Release shall give individual indication for each type of fault

f. Low voltage switchgear, MCCB.

a)	a) For 600 Amps, 4P, 50KA b) For 400 Amps. 4P, 50 KA. c) For 250 Amps. 4 P, 50 KA	Outgoing feeders – 4 nos. Outgoing feeders – 2 nos. Outgoing feeders – 2 nos.
b)	MCCBs rated voltage & Rated frequency (Hz)	415v +/- 10% at 50Hz
c)	Number of poles	4
d)	Current rating Amps (rms)	600/400/250 Amps
e)	MCCB rated 3 phase short circuit breaking capacity Ics = Icu Rated impulse withstand voltage(kV)	50 KA minimum at 415v and 50Hz
f)	MCCB rated 3 phase short circuit withstand capacity, Icw	8kA for 1sec
g)	Rated insulation voltage (V) at 50 Hz	690
	MCCB mechanical & electrical endurance	As per IS 13947 / IEC

h)	MCCB category of duty	B as per IS / IEC 947
i)	MCCB indications	ON, OFF & TRIP
j)	MCCB protection	front accessible Adjustable thermal and fixed magnetic setting. (Thermal setting for overload adjustable from 40 % - 100%

**Safety Devices:**

Rubber Mates, Fire Extinguisher & First Aid Box

➤ **Front Plate:**

The front shall include a clear mimic diagram which indicates different functions. The position indicators shall give a true reflection of the position of the main contacts and shall be clearly visible to the operator. The lever operating direction shall be clearly indicated in the mimic diagram. The manufacturer's plate shall include the switchboard's main electrical characteristics.

➤ **Danger Board:**

The danger Board plate as per relevant IS shall be riveted on the front plate of the CSS RMU in Languages viz. Gujarati, Hindi, English.

**TYPE and ROUTINE TESTS:**

**Type tests:**

Units should be type tested in accordance with IEC: - 62271 -202. The following type tests should perform on the HT Switchgear and report should submit during the approval. –

Short time and peak withstand current test –

Temperature rise tests –

Dielectric tests –

Test of apparatus i.e. circuit breaker and earthing switch

Arc fault test –

Measurement of resistance of main circuit.

Mechanical endurance test. –

Duty cycle test. –

➤ **ROUTINE TESTS:**

Routine tests should be carried out in accordance with IEC 62271-200, IS: - 2026(Trafo), IS :- 8623 (LV), IEC 62271-202 standards. These tests should be ensuring the reliability of the unit. Below listed test should be performed as routine tests before the delivery of units;

- Withstand voltage at power frequency
- Measurement of the resistance of the main circuit
- Withstand voltage on the auxiliary circuits
- Operation of functional locks, interlocks, signalling devices and auxiliary devices
- Suitability and correct operation of protections, control instruments and electrical connections of the circuit breaker operating mechanism

- Verification of wiring - Visual inspection

All acceptance and routine tests as stipulated in the respective applicable standards amended up to date for all the equipment shall be carried out by the contractor in the presence of DPA representative & TPIA without any extra cost to DPA before dispatch.

The contractor, in the presence of representative of DPA & TPIA, shall carry out all above acceptance and routine tests.

➤ DRAWINGS:

All drawings shall conform to relevant IEC Standards Specification. All drawings shall be in ink.

The Contractor shall submit dimensional general arrangement drawings of the equipment, illustrative and descriptive literature in double copy for various items in the CSS, which are all essentially required for future automation.

- i) Schematic diagram of the RMU, Trafo, HV-LV panel
- ii) Instruction manuals
- iii) Catalogues of spares recommended with drawing to indicate each items of spares
- iv) List of spares and special tools recommended by the supplier.
- v) Copies of Type Test Certificates as per latest IS/IEC.
- vi) Drawings of equipment, relays, control wiring circuit, etc.
- vii) Foundation drawings of CSS.
- viii) Dimensional drawings of each material used for item
- ix) Actual single line diagram of CSS with or without extra combinations shall be made displayed on the front portion of the MV/LV so as to carry out the operations easily.

The following should be supplied by contractor:

Copies in triplicate of printed volumes of operation, maintenance and erection manuals in English along with the copies of approved drawings and test reports etc. sets of the manuals as above shall be supplied to the Engineer-in-Charge along with a soft copy of the all Technical and Drawing.

➤ NAME PLATE:

CSS and its associated equipment shall be provided with a nameplate legible and indelibly marked with at least the following information.

- Name of manufacturer
- Type
- Serial number
- Voltage Current
- Frequency
- Purchase Order number and date
- Month and Year of supply.

**Technical Specification No. 2:**

This includes Installation, testing & Commissioning of Compact S/s, Safety Devices as per standard which includes outdoor type SF6 filled, with combinations of load break isolators & breakers.

The scope includes, provide Civil Foundation, necessary trench (for cable in/Out) as per approved foundation drawing (Provided by manufacturer), after erection of CSS, necessary testing & commissioning as per QAP (Provided by manufacturer) shall be in the scope contractor, the works also include with necessary Tools, Tackle, Cable end termination kits, cable laying. After installation of panel, necessary test and trial are to be carried out for proper functioning of safety, devices, relay etc. and before charging CSS Panel, all the tests required under relevant ISS and IEC – Rules 1956 shall be carried out and the result shall be in conformity with specifications and copies of test results shall be furnished to Engineer-in-Charge. The work includes supply & fixing of required length of insulated Rubber Mat having withstand capacity up to 22 kV, the Rubber Mat shall be laid in such a way, near the panel for operation of System.

If required, some alteration / modification is in the scope of contractor as per the instructions of Engineer-in- Charge. The work includes all labor & material required for installations, testing and commissioning of CSS as directed by Engineer-in-Charge.

**Technical Specification No. 3:**

This item includes supply at site following type & size of XLPE Insulated 11kV grade aluminum conductor XLPE insulated armoured cable confirming to IS 7098 (Part-II) 1988 with latest amendments with ISI mark. The cable shall have marking/embossing at the interval of every meter showing its progressive length. The contractor shall submit type test certificate at the time of supply of Cable at site. The type test certificate shall not be more than 3 years old. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

- a) **3 Core, 150 Sq. mm (E).**

**Technical Specification No. 4:**

This includes supply at site 1.1 kV grade, following size of aluminum conductor XLPE insulated armoured cable confirming to IS 7098 (Part-I) 1985 with up to date amendments and of approved make with ISI mark. The cable shall have marking/embossing at the interval of every meter showing its progressive length.

The size of LT armoured XLPE aluminum conductor cable are:

- a) **4 Core, 300 Sq.mm,**
- b) **4 Core, 150 Sq.mm,**
- c) **4 Core, 50 Sq.mm,**

The contractor shall submit type test certificate at the time of supply of Cable at site. The type test certificate shall not be more than 3 years old. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

**Technical Specification No. 5:**

The item includes laying of cable of size 3 Core, 150 Sq. (E) mm XLPE Insulated aluminum conductor XLPE insulated armoured cable of 11kV grade in the various route. The contractor shall providing & fixing heat shrinkable straight through joint of relevant size of approved make if the laying of cable shall be more than standard drum length. The scope also includes providing & fixing (including required foundation) necessary route indicated in day & night visible, 11 KV route marker (Made by RCC approx. 300 mm width 1000 mm height) wherever cable laid in underground approx. every 100 mtr or as decided by EIC, accordingly calculate the Qty.

- 5(a).** Through HDD by providing & laying cable in HDPE pipe (I.D. 6" & wall thickness 12mm) in Railway / road /RCC/culvert etc. The cable shall be laid after through HDD for passing the single / double cable, in case of separate cable separate HDD will be required. Cable shall be laid underneath by using Horizontal Directional Drilling (HDD) method by putting HDPE (I.D. 6" & wall thickness 12mm)} shall in contractor scope), the contractor shall arrange JCB Machine / pneumatic breakers for excavation in RCC/Road, water for drilling, de- watering pump, HDD equipment's at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Schedule-B, Part-B, No.02 (Civil Part). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at to construction of RCC Road/ Rail network or as per directed by EIC. For single cable individual HDPE shall be pass through a road /rail / Culvert crossing, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench. After standard length in excavated trench/tunnel and also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.
- 5(b).** Through Excavation in hard & soft soil and laying cable in HDPE pipe (I.D. 6" & wall thickness 12mm) etc. The trench to be excavated of 300 mm width & 1.0-meter depth. Clean the trench area & provide 50mm of river sand bed in the bottom of the excavated trench. The cable shall be laid over inside the HDPE pipe & pipe shall be putted over the bed of river sand. The HDPE (I.D. 6" & wall thickness 12mm)} shall in contractor scope), the contractor shall have arranged JCB Machine / pneumatic breakers for excavation in Hard / soft soil, if de- watering pump is required for removal of muddy water from the trench, same shall be in the scope of Contractor, at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 of Schedule-B, Part-B (Civil Part). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at through Hard /Soft Soil or as per directed by EIC. For single cable individual HDPE shall be passes through Hard /Soft Soil or as per directed by EIC, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench, parallels. After standard length in excavated trench/tunnel and sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits/Trench as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.
- 5(c).** The item includes laying of cable size 3 Core, 150 Sq. mm XLPE Insulated aluminum conductor XLPE insulated armoured cable of 11kV grade in the existing cable trench. The cable shall be laid after opening of trench by removing the RCC NP-2 Hume pipe /RCC covers /MS chequered plates. After laying of the cable, cable trench shall be properly covered with existing RCC NP-2 Hume pipe /chequered plates as per original. The item includes required material and labour as directed by Engineer in charge.

### **Technical Specification No. 6:**

The item includes laying cable of size 4 Core, 300 Sq. mm LT XLPE Insulated aluminum conductor in the various route. The contractor shall provide heat shrinkable straight through joint of relevant size of approved make if the laying of cable shall be more than standard drum length. The scope also includes providing & fixing (including required foundation) necessary route marker (day & night visible) for LT cable route (Made by RCC approx. 300 mm width 1000 mm height) wherever cable laid in underground approx. every 100 mtr or as decided by EIC, accordingly calculate the qty.

- 6(a).** Through HDD by laying 4Cx 300 sq.mm LT XLPE, aluminum armored cable in HDPE pipe (I.D. 6" & wall thickness 12mm) in Railway / road /RCC/culvert etc. The cable shall be laid after through HDD for passing the single / double cable, in case of separate cable separate HDD will be required. Cable shall be laid underneath by using Horizontal Directional Drilling (HDD) method by putting HDPE (I.D. 6" & wall thickness 12mm)} shall in contractor scope), the contractor shall arrange JCB Machine / pneumatic breakers for excavation in RCC/Road, water for drilling, de- watering pump, HDD equipment's at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 Schedule-B, Part-B (Civil Part). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at to construction of RCC Road/ Rail network or as per directed by EIC. For single cable individual HDPE shall be pass through a road /rail / Culvert crossing, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench. After standard length in excavated trench/tunnel and also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.
- 6(b).** Through Excavation in hard & soft soil and laying cable 4Cx 300 sq.mm LT XLPE, aluminum armored cable in HDPE pipe (I.D. 6" & wall thickness 12mm) etc. The trench to be excavated of 300 mm width & 1.0-meter depth. Clean the trench area & provide 50mm of river sand bed in the bottom of the excavated trench. The cable shall be laid over inside the HDPE pipe & pipe shall be putted over the bed of river sand. The HDPE (I.D. 6" & wall thickness 12mm)} shall in contractor scope), the contractor shall have arranged JCB Machine / pneumatic breakers for excavation in Hard / soft soil, if de- watering pump is required for removal of muddy water from the trench, same shall be in the scope of Contractor, at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 Schedule-B, Part-B (Civil Part). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at through Hard /Soft Soil or as per directed by EIC. For single cable individual HDPE shall be passes through Hard /Soft Soil or as per directed by EIC, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench, parallels. After standard length in excavated trench/tunnel also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits/Trench as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.

### **Technical Specification No. 7:**

The item includes laying cable of size 4 Core, 150 Sq. mm LT XLPE Insulated aluminum conductor in the various route. The contractor shall provide heat shrinkable straight through joint of relevant size of approved make if the laying of cable shall be more than standard drum length. The scope also includes providing & fixing (including required foundation) necessary route marker (day & night visible) for LT cable route (Made by RCC approx. 300 mm width 1000 mm height) wherever cable laid in underground approx. every 100 mtr or as decided by EIC, accordingly calculate the qty.

- 7(a).** Through HDD by laying 4Cx 150 sq.mm LT XLPE, aluminum armored cable in HDPE pipe (I.D. 6'' & wall thickness 12mm) in Railway / road /RCC/culvert etc. The cable shall be laid after through HDD for passing the single / double cable, in case of separate cable separate HDD will be required. Cable shall be laid underneath by using Horizontal Directional Drilling (HDD) method by putting HDPE (I.D. 6'' & wall thickness 12mm)} shall in contractor scope), the contractor shall arrange JCB Machine / pneumatic breakers for excavation in RCC/Road, water for drilling, de- watering pump, HDD equipment's at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 Schedule-B, Part-B (Civil Part)). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at to construction of RCC Road/ Rail network or as per directed by EIC. For single cable individual HDPE shall be pass through a road /rail/ Culvert crossing, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench. After standard length in excavated trench/tunnel and also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.
- 7(b).** Through Excavation in hard & soft soil and laying cable 4Cx 150 sq.mm LT XLPE, aluminum armored cable in HDPE pipe (I.D. 6'' & wall thickness 12mm) etc. The trench to be excavated of 300 mm width & 1.0-meter depth. Clean the trench area & provide 50mm of river sand bed in the bottom of the excavated trench. The cable shall be laid over inside the HDPE pipe & pipe shall be putted over the bed of river sand. The HDPE (I.D. 6'' & wall thickness 12mm)} shall in contractor scope), the contractor shall have arranged JCB Machine / pneumatic breakers for excavation in Hard / soft soil, if de- watering pump is required for removal of muddy water from the trench, same shall be in the scope of Contractor, at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 Schedule-B, Part-B (Civil Part)). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at through Hard /Soft Soil or as per directed by EIC. For single cable individual HDPE shall be passes through Hard /Soft Soil or as per directed by EIC, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench, parallels. After standard length in excavated trench/tunnel also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits/Trench as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.

### **Technical Specification No. 8:**

The item includes laying cable of size 4 Core, 50 Sq. mm LT XLPE Insulated aluminum conductor in the various route. The contractor shall provide heat shrinkable straight through joint of relevant size of approved make if the laying of cable shall be more than standard drum length. The scope also includes providing & fixing (including required foundation) necessary route marker (day & night visible) for LT cable route (Made by RCC approx. 300 mm width 1000 mm height) wherever cable laid in underground approx. every 100 mtr or as decided by EIC, accordingly calculate the qty.

- 8(a).** Through HDD by laying 4Cx 50 sq.mm LT XLPE, aluminum armored cable in HDPE pipe (I.D. 6'' & wall thickness 12mm) in Railway / road /RCC/culvert etc. The cable shall be laid after through HDD for passing the single / double cable, in case of separate cable separate HDD will be required. Cable shall be laid underneath by using Horizontal Directional Drilling (HDD) method by putting HDPE (I.D. 6'' & wall thickness 12mm)} shall in contractor scope), the contractor shall arrange JCB Machine / pneumatic breakers for excavation in RCC/Road, water for drilling, de- watering pump, HDD equipment's at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 of Schedule-B (Civil Part). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at to construction of RCC Road/ Rail network or as per directed by EIC. For single cable individual HDPE shall be pass through a road /rail / Culvert crossing, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench. After standard length in excavated trench/tunnel also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in- Charge.
- 8(b).** Through Excavation in hard & soft soil and laying cable 4Cx 50 sq.mm LT XLPE, aluminum armored cable in HDPE pipe (I.D. 6'' & wall thickness 12mm) etc. The trench to be excavated of 300 mm width & 1.0- meter depth. Clean the trench area & provide 50mm of river sand bed in the bottom of the excavated trench. The cable shall be laid over inside the HDPE pipe & pipe shall be putted over the bed of river sand. The HDPE (I.D. 6'' & wall thickness 12mm)} shall in contractor scope), the contractor shall have arranged JCB Machine / pneumatic breakers for excavation in Hard / soft soil, if de- watering pump is required for removal of muddy water from the trench, same shall be in the scope of Contractor, at their own cost. In every 30 mtr or as per direction of EIC contractor shall provide Pre Cast PCC chamber with RCC covers to connect the onward HDPE through chamber by providing suitable CAP (as per Item No. 02 Schedule-B (Civil Part). Contractor responsible to arrange the continue length HDPE pipe as per route for cable laying, or as directed by EIC. No Jointing by nut & bolt in HDPE pipe allow by DPA, HDPE pipe shall be join (if required) by special splashing method. The cable shall be pass through heavy duty HDPE pipe buried at through Hard/Soft Soil or as per directed by EIC. For single cable individual HDPE shall be passes through Hard /Soft Soil or as per directed by EIC, for separate cable; separate HDPE pipe shall pass through the Tunnel / trench, parallels. After standard length in excavated trench/tunnel also sealing of HDPE pipe ends by suitable cap at every manhole. Back filling & dressing of excavated hole/ pits/Trench as per its original position is in contractor scope. This includes all labour and material as directed by Engineer-in-Charge.

## **Technical Specification No. 9:**

### **(a) Main Load Point Panel:**

This item includes design, manufacture, testing & supply at site outdoor type Load Point Panel with double door, broader top canopy; handle with locking arrangement (pad lock 5 level with keys).

- Load point panel shall be fabricated from Stainless Steel sheet of 2.00 mm thick, 304 Grade Stainless Steel.
- Load point panel each & individual feeder (O/C & I/C) shall be compartmentalized.
- The Board shall be enclosed by stainless sheet steel of minimum 2 mm thickness smoothly finished & level, door & covers shall be made 1.6 mm thick stainless sheet steel. Adequate stiffeners shall be provided wherever necessary.
- Load point panel shall be dust & vermin proof.
- Protection Class: IP 65.
- Load point panel shall have bottom Cable entry.
- All panel edges and door edges shall be reinforced against distortion. Cut outs shall be true in shape and devoid of sharp edges.
- Continue SS metal Hinged support shall be provided for Door.
- The complete structure shall be rigid, self-supporting free from vibration, twists & bends.

The Load Point Panel shall be specious for easy maintenance and shall be provided with following electrical items:

- 1) 600 Amp FP MCCB, 415 Volt, 35 kA breaking capacity with Microprocessor based: 2No. For Incomer.
  - 2) 600-Amp FP changeover switch. -1 Nos.
  - 3) 400 Amp FP MCCB, 415 Volt, 25kA: 10 Nos. as Outgoing feeder
  - 4) Digital Multi-Function Energy Meter, Accuracy Class 0.5 with RS485: 1 No. for Incomer
  - 5) 600/5 Amp CT (Class 0.5): 3 Nos.
  - 6) Phase R, Y & B Indication Lamp: 3 Nos.
- Work Space Clearance: Safety regulations (like the NEC and OSHA in some regions) typically require a minimum clear working space in front of the panel (e.g., 3 feet deep, 30 inches wide), and the panel doors must be able to open at least 90 degrees.
  - Earthing/Grounding: As per safety standards IS 3043:2018, prevents electric shock by carrying fault current safety to earth. Connected to two separate GI strips (20 X 3 mm).

### **Main Bus & Taps:**

The board shall be provided with three phase and neutral bus-bar. Bus-bars shall be of uniform cross section throughout the length of the board and up to the incoming terminals of feeder circuit breaker/switch. The bus-bars shall be made of high conductivity aluminum alloy

of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts, having current capacity 1000 amps. Bus-bars shall be thoroughly cleaned at the joint locations and suitable contact grease shall be applied just before making a joint, separate supports shall be provided for each phase of the bus-bars. If a common support is provided for all three phase, anti-tracking barriers shall be incorporated. Bus-bars shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents. Bus bar supports shall be made of hylum sheets; glass reinforced moulded plastic material or cast resin.

All these components shall be mounted/erected in the Load Point Panel by means of suitable cadmium passivated hardware. The Panel shall be complete in all respects with cable glands, lugs for incoming and outgoing cables including interconnection with PVC insulated cable single core, standard copper conductor of 650/1100V grade. Load point panel shall be provided with 2 Nos. SS terminals for earthing.

The Load Point Panel shall be tested as per the relevant IS standard. Before Manufacturing the Load Point Panel, the relevant test certificate in support of Panel manufacturing, along with design & drawing shall be submitted to DPA for approval and also all Electrical accessories shall be used as per approved Make List of DPA.

The rates shall be inclusive of all the taxes (excluding GST), insurance, transportation, unloading as directed by Engineer-in-Charge.

**(b) Sub Load Point Panel:**

This item includes design, manufacture, testing & supply at site outdoor type Load Point Panel with double door, broader top canopy, handle with locking arrangement (pad lock 5 level with keys).

- Load point panel shall be fabricated from Stainless Steel sheet of 2.00 mm thick, 304 Grade Stainless Steel.
- Load point panel each & individual feeder (O/C & I/C) shall be compartmentalized.
- The Board shall be enclosed by stainless sheet steel of minimum 2 mm thickness smoothly finished & level, door & covers shall be made 1.6 mm thick stainless sheet steel. Adequate stiffeners shall be provided wherever necessary.
- Load point panel shall be dust & vermin proof.
- Load point panel shall have bottom Cable entry.
- All panel edges and door edges shall be reinforced against distortion. Cut outs shall be true in shape and devoid of sharp edges.
- Continue SS metal Hinged shall be provided for Door.
- Protection Class: IP 65.
- The complete structure shall be rigid, self-supporting free from vibration, twists & bends.

The Load Point Panel shall be specious for easy maintenance and shall be provided with following electrical items:

- 1) 400 Amp FP MCCB, 415 Volt, 35 kA breaking capacity with Microprocessor based: 2 No. for Incomer.
- 2) 150 Amp FP MCCB, 415 Volt, 25kA: 10 Nos. as Outgoing feeder
- 3) Digital Multi-Function Energy Meter, Accuracy Class 0.5 with RS485: 1 No. for Incomer
- 4) 400/5 Amp CT (Class 0.5): 3 Nos.
- 5) Phase R, Y & B Indication Lamp: 3 Nos.

#### **Main Bus & Taps:**

The board shall be provided with three phase and neutral bus-bar. Bus-bars shall be of uniform cross section throughout the length of the board and up to the incoming terminals of feeder circuit breaker/switch. The bus-bars shall be made of high conductivity aluminum alloy of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts. Bus-bars shall be thoroughly cleaned at the joint locations and suitable contact grease shall be applied just before making a joint, separate supports shall be provided for each phase of the bus-bars. If a common support is provided for all three phase, anti-tracking barriers shall be incorporated. Bus-bars shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents. Bus bar supports shall be made of hylum sheets; glass reinforced moulded plastic material or cast resin.

All these components shall be mounted/erected in the Load Point Panel by means of suitable cadmium passivated hardware. The Panel shall be complete in all respects with cable glands, lugs for incoming and outgoing cables including interconnection with PVC insulated cable single core, standard copper conductor of 650/1100V grade. Load point panel shall be provided with 2 Nos. SS terminals for earthing.

The Load Point Panel shall be tested as per the relevant IS standard. Before manufacturing, the Load Point Panel, the relevant test certificate in support of Panel manufacturing, along with design & drawing shall be submitted to DPA for approval and all Electrical accessories shall be used as per approved Make List of DPA.

The rates shall be inclusive of all the taxes (excluding GST), insurance, transportation, unloading as directed by Engineer-in-Charge.

#### **Technical Specification No. 10:**

- (a) The work includes installation, testing & commissioning of supplied Main Load Point Panel. The Load Point Panel shall be erected on cement concrete platform duly plastered with tapped collar of suitable size having height of 1750 mm above ground level including grouting of stainless steel legs of 304 Grade in reinforced foundation of suitable design is in the scope of contractor. This work also includes termination of the incoming & outgoing Cable along with providing suitable size of glands (Gland suitable for XLPE aluminium Incoming cable size: 300 sq.mm & Outgoing cable size: 300 sq.mm) and necessary earth linking connection. The scope of works includes necessary marking with radium sticker danger board in three languages. The work includes all material, labour, tools & tackles as directed by Engineer-In- charge.
- (b) The work includes installation, testing & commissioning of supplied Sub Load Point Panel. The Load Point Panel shall be erected on cement concrete platform duly plastered with tapped collar of suitable size having height of 1750 mm above ground level including grouting of stainless steel legs of 304 Grade in reinforced civil foundation of suitable design is in the scope of contractor. This work also includes termination of the incoming & outgoing Cable along with

providing suitable size of glands (Gland suitable for XLPE aluminum Incoming cable size: 300 sq.mm & Outgoing cable size: 50 sq.mm) and necessary earth linking connection. The scope of works includes necessary marking with radium sticker danger board in three languages. The work includes all material, labour, tools & tackles as directed by Engineer-In-charge.

**Technical Specification No. 11:**

This include supply & fixing of indoor end termination kit suitable for 3C x 150 sq.mm HT XLPE, HT armored aluminum conductor XLPE Cable of 11 kV grade. The joint shall make in such a way that joined section can be reeled without sagging and the joint shall be electrically and mechanically permanent. This includes all required material, tools & tackles and labour as directed by Engineer in charge.

**Technical Specification No. 12:**

This include supply & fixing the HT heat Shrinkable Straight Joint kit suitable for 3C x 150 sq.mm HT XLPE, HT armored aluminum conductor XLPE Cable of 11 kV grade. The joint shall make in such a way that joined section can be reeled without sagging and the joint shall be electrically and mechanically permanent. This includes all required material, tools & tackles and labour as directed by Engineer in charge.

**Technical Specification No. 13:**

This item includes preparation of maintenance free earth station by providing 80mm diameter, 3 meter, 100-micron hot dipped GI chemical electrode with back fill compound including accessories & masonry work. A cement concrete (ratio 1:4:8) chamber of at least 300 mm × 300 mm shall be prepared and a RCC/CI cover of suitable size shall be provided for the chamber. The work shall be carried out to entire satisfaction of Engineer in charge. This work includes all material, labour, tools & tackles as directed by Engineer-In-Charge.

**Technical Specification No. 14:**

This item includes preparation of maintenance free earth station by providing 80mm diameter, 3 meter, 250-micron Copper bonded chemical electrode with back fill compound including accessories & masonry work. A cement concrete (ratio 1:4:8) chamber of at least 300 mm × 300 mm shall be prepared and a RCC/CI cover of suitable size shall be provided for the chamber. The work shall be carried out to entire satisfaction of Engineer in charge. This work includes all material, labour, tools & tackles as directed by Engineer-In-Charge.

**Technical Specification No. 15:**

This item includes supply at site, laying, fixing and connecting of copper strip of size 50x6 mm from earth station to CSS as directed. The copper strip shall be laid from earth station to CSS and shall be clamped suitably on wall/floor or buried in the ground/ trench as directed. This work includes all material, labour, tools & tackles as directed by Engineer-In-Charge.

**Technical Specification No. 16:**

- (a) This item includes supply at site, laying, fixing and connection of GI strip of size 50x6 mm from earth station to Feeder Pillar as directed. The GI strip shall be laid and clamped suitably on wall/floor/structure or buried in the ground/ trench as directed. This work includes all material, labour, tools & tackles as directed by Engineer-In-Charge.

<b>Approved Make List of Electrical Items</b>		
<b>Sr. No.</b>	<b>Description</b>	<b>Recommended Makes</b>
1	HV VCB	Siemens/ Crompton Greaves/ ABB/ Schneider
2	HV Gas Insulated Breaker	Siemens/ Schneider/ ABB
3	Power Transformer	Voltamp/ Crompton Greaves/ Bharat Bijlee/ BHEL/ Siemens/ ABB/ Schneider/ T&R
4	Distribution Transformer	EMCO/ Kirloskar/ Patson/ Voltamp/ ABB/ Schneider/ T&R
5	Resin Cast Transformer	Voltamp/ Kirloskar/ EMCO
6	Dry Cast Transformer	Voltamp/ Kirloskar/ EMCO
7	HT XLPE Cable	Polycab/ Torrent/ RPG Asian/ Gloster/ Unistar
8	LT XLPE Cable	Polycab/ Torrent/ RPG Asian/ Rallison/ Primecab/ Havells/ Unistar/ Avocab/ Allcab/ Adcab
9	LT ACB	Siemens/ L&T/ Schneider Electric/ C&S
10	Protection Relay	Areva/ L&T/ Siemens/ ABB/ C&S
11	LT Panel	CPRI Approved
12	Changeover Switch	Siemens/ L&T/ ABB/ C&S/ Schneider Electric/ Legrand/ Indoasian
13	SFU for Main LT Distribution Panel	Siemens/ L&T/ ABB/ C&S
14	SFU for Distribution Panel & Feeder Pillar	Siemens/ L&T/ ABB/ C&S/ Schneider Electric/ Legrand/ Indoasian/ Havells
15	MCCB for Main LT Distribution Panel	Siemens/ L&T/ ABB
16	MCCB for Distribution Panel & Feeder Pillar	Siemens/ L&T/ ABB/ C&S/ Schneider Electric/ Legrand/ Indoasian/ Havells
17	MCB/ELCB/RCCB/RCCBO for Main LT Distribution Panel	Siemens/ Hager/ L&T/ ABB
18	MCB for Distribution Panel & Feeder Pillar	Siemens/ L&T/ ABB/ C&S/ Schneider Electric/ Legrand/ Indoasian/ Havells/ Standard
19	Distribution Board	Standard/ Hensel/ Legrand/ Indoasian/ Havells
20	Multi-Function Digital Meter for Main LT Distribution Panel/ Digital kWh Meter	L&T/ Enercon/ Secure/ L&G/ Rishabh

21	Analog Volt/Ampere Meter for Distribution Panel & Feeder Pillar	Rishabh/ AE/ Enercon/ L&T
22	Selector Switch for Voltmeter/Ampere Meter	L&T/ Siemens/ C&S
23	Power Contactor & Overload Relay	L&T/ Siemens/ ABB
24	Quartz Time Clock Switch	L&T/ Indoasian/ Siemens
25	PVC Wire with Copper Conductor	RR Kabel/ KEI/ Polycab/ Milex/ Gujcab/ Standard/ Finolex/ Anchor
26	Flush type Switch, Socket, Holder, Ceiling Rose & Electronic Regulator	Anchor/ MK/ Northwest/ Vinay/ Panama/ Havells
27	Bells/ Call Bells	Anchor/ Legend/ MK/ Northwest
28	Modular Switch, Socket, Plate & Box	Anchor/ MK/ Northwest/ Legrand/ Havells/ Indoasian/ Siemens
29	PVC Conduit/ Oval Conduit & Casing Capping and Accessories	Precision/ Vulcan/ Finolex/ Garware/ Restoplast/ Swastik/ BPI
30	Lamp & Fluorescent Lamps	Philips/ Bajaj/ Wipro/ Crompton/ Osram/ Surya Roshni/ GE
31	HPMV & Metal Halide Lamps	Philips/ Bajaj/ Wipro/ Crompton/ Osram/ Surya Roshni/ GE
32	Ignitor for HPSV & Metal Halide Lamps	Philips/ Bajaj/ Wipro/ Crompton/ Osram/ Surya Roshni/ GE
33	Luminaries	Philips/ Bajaj/ Wipro/ Crompton/ Osram/ Surya Roshni/ GE
33	LED Luminaries	Philips/ Bajaj/ Wipro/ Crompton/ Surya/ Pyrotech/ Syska/ Nessa having Surge Protection $\geq 10kV$ for Fittings & Internal Surge Protection for Driver of $\geq 4kV$ , LED Chip of only OSRAM/ CREE/ Philips Lumileds/ Citizen/ Nicia, with LM79 & LM80 Certification
34	Ceiling Fan	Bajaj/ Orient/ Usha/ Crompton/ Almonard/ GEC
35	Wall mounting Fan	Bajaj/ Orient/ Usha/ Crompton/ Almonard/ GEC
36	Exhaust Fan	Bajaj/ Orient/ Usha/ Crompton/ Almonard/ GEC
37	Heavy duty Industrial Wall mounting Fan	Bajaj/ Orient/ Usha/ Crompton/ Almonard/ GEC
38	Water Cooler	Voltas/ Usha/ Blue Star
39	Air Conditioner	Voltas/ Carrier/ Blue Star/ Usha/ Hitachi/ LG/

		Samsung/ Onida
40	Refrigerator	Voltas/ Carrier/ Blue Star/ Usha/ Hitachi/ LG/ Samsung/ Whirlpool
41	Voltage Stabilizer	Veeline/ Capri
42	Inverter	Sukam/ Microtek
43	Engine for D.G. Set	Cummins/ Greaves/ Kirloskar/ Caterpillar/ Ashok Leyland/ Volvo
44	Alternator for D.G. Set	Stamford/ Crompton Greaves/ Jyoti/ Kirloskar Electric
45	Electric Motor	Alstom/ Crompton Greaves/ Siemens/ Kirloskar/ ABB
46	Water Pump	Swastik/ KSB
47	Water Geyser	Bajaj/ Usha/ Crompton Greaves/ Spherohot/ Racold
48	Lug & Cable Glands	Dowells/ Jainson/ Braco

Sd/-

**Signature & Seal of Contractor**

**Executive Engineer (E)  
Deendayal Port Authority**

## PPAYMENT TERMS

- All payments shall be made in Indian rupees unless specifically mentioned.
- Payment Terms:

Sr. No.	Payment Stages for Part A	
1	After submission of detailed engineering, design & drawings of Part A of Schedule-B after verification by TPIA.	10 % of the total cost of item No. 01
2	On supply of all the major items (High Mast Towers, LED fixture & IOT compatible panel of sr. No. 01) at the site after their acceptance, certification & verification by TPIA.	40 % of the total cost of item No. 01.
3	On successful installation, erection of all major items as above, certification & verification by TPIA.	40% of the total cost of item No. 01.
4	On successful testing, commissioning, installation, field testing, handing over of the entire High mast tower at location at 50.95 hector & 35 hector as per the scope of work, after certification & verification by TPIA.	10% of the total cost of item No. 01.

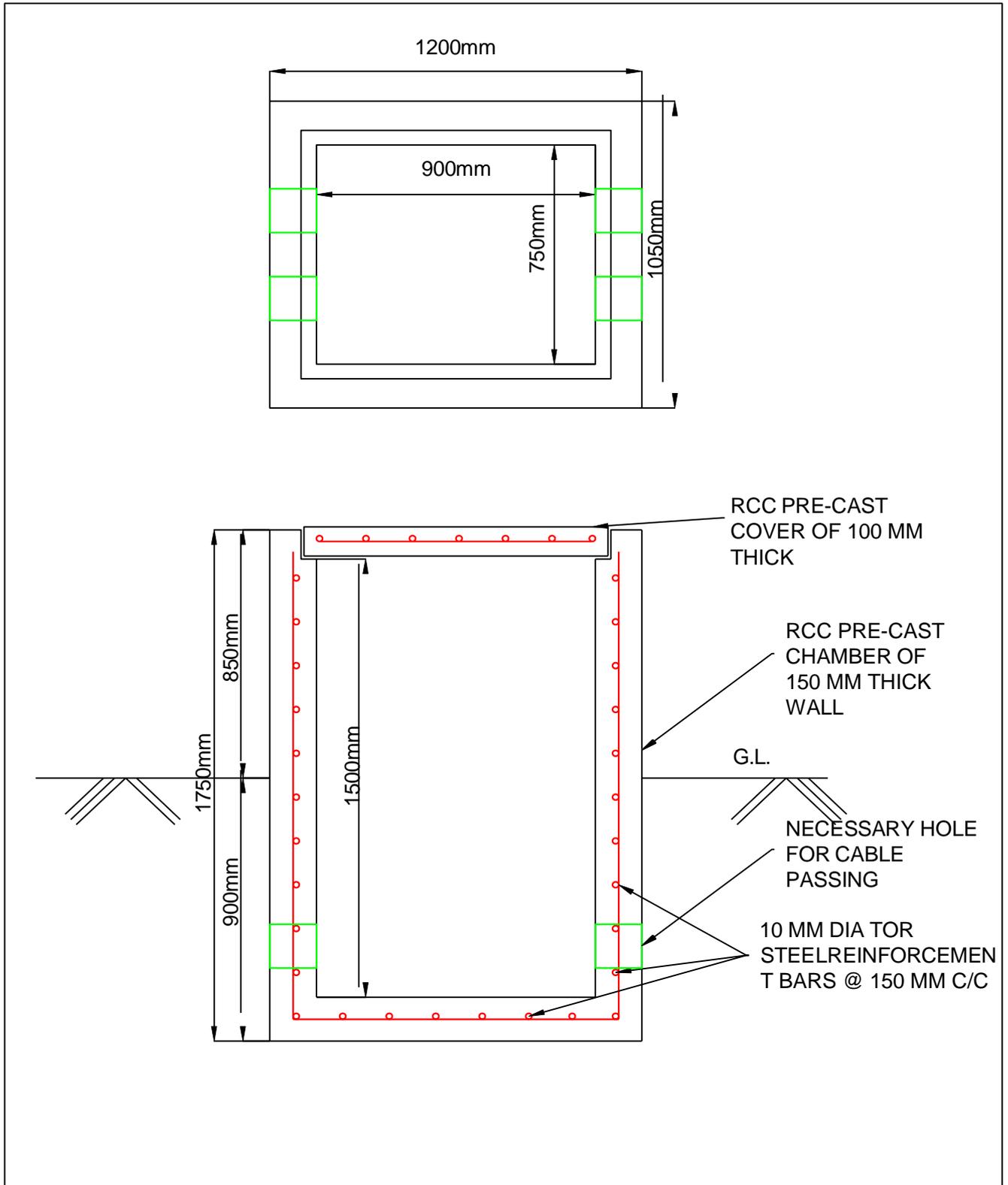
Sr. No.	Payment Stages for Part B	
1	50% payment (subject to deductions as per tender conditions) will be released after receipt of material at site in good condition, after obtaining insurance cover as per tender condition (If TPI appointed then after inspection & certification of the same by Third Party Inspection Agency) and after inspection & acceptance of material by DPA	
2	40% of item rate (subject to deductions as per tender conditions) after completion of erection, installation, testing and commissioning etc. and 90% of item rate for item covers only laying/fixing etc. (If TPI appointed then after inspection & certification of the same by Third Party Inspection Agency).	
3	10% (subject to deductions as per tender conditions) will be released after successful completion of whole work (If TPI appointed then after inspection & certification of the same by Third Party Inspection Agency) and handing over to DPA.	

Sd/-

**Signature & Seal of Contractor**

**Executive Engineer (E)  
Deendayal Port Authority**

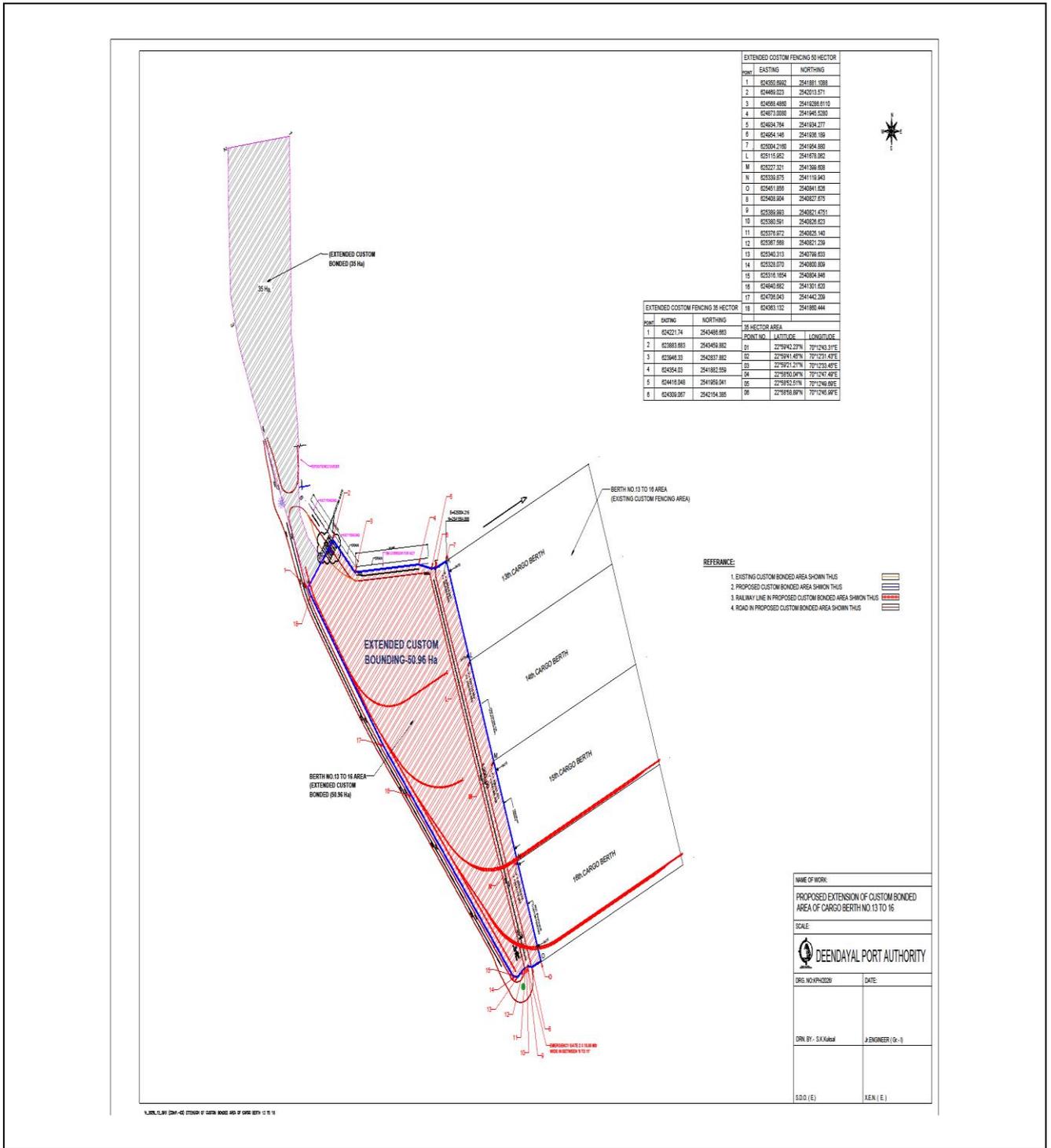
Pre-Cast RCC M-30 chamber: (Part-B/ Item No. 17) Drawing - I



Signature & Seal of Contractor

Sd/-  
Executive Engineer (E)  
Deendayal Port Authority

# High Mast Installation 50.96 & 35 Hecto Location: Drawing - II



Signature & Seal of Contractor

Sd/-  
Executive Engineer (E)  
Deendayal Port Authority