DEENDAYAL PORT AUTHORITY
ISO 9001:2008 | ISO 14001 | ISPS Compliant Port

Office of Executive Engineer (Electrical), Ground Floor, Nirman Building, New Kandla, Kutch, Pin Code 370210.

No.: EL/AC/2776 Date: 22/03/2024

EXPRESSION OF INTEREST [EOI]

"Construction of new Godowns in place of existing godown no. 19 to 21 & 25 inside Cargo Jetty area – Electrification Work"

(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 "Construction of new Godowns in place of existing godown no. 19 to 21 & 25 inside Cargo Jetty area - Electrification Work" from the reputed firms from those who have executed similar work in Government/public sectors 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 for the said work in BOQ format as enclosed at Annexure I. The completed EOI (Expression of Interest) shall be submitted to the office of the undersigned on or before 15/04/2024. A soft copy of EOI is also acceptable through e-mail Id xenedpa@gmail.com

Executive Engineer (E)
Deendayal Port Authority

ANNEXURE – I

Sr. No.	Description	Qty.	Unit	Rate	Amount
1	Supply at site 5 way, 11kV Gas Insulated RMU as per Technical Specification No. 1	1	No.		
2	Installation, testing & commissioning of 5 way, 11kV Gas Insulated RMU as per Technical Specification No. 2	1	No.		
3	Supply at site 3 core, 150 Sq. mm HT armoured aluminium conductor XLPE cable of 11kV grade as per IS: 7098 (Part - II) 1988 & as per Technical Specification No. 3	70	m		
4	Laying, Testing & Commissioning of 3 core, 150 Sq. mm HT XLPE cable in existing Cable Trench as per Technical Specification No. 4	70	m		
5	Supply at site Indoor type Heat shrink end termination kit for 3 core, 150 Sq. mm 11kV XLPE aluminium cable as per Technical Specification No. 5	5	No.		
6	Fixing of Indoor type Heat shrink end termination kit for 3 core, 150 Sq. mm 11kV XLPE aluminium cable as per Technical Specification No. 6	5	No.		
7	Supply at site Heat shrink straight through joint kit for 11kV, 3 core, 150 Sq. mm XLPE aluminium cable as per Technical Specification No. 7	1	No.		
8	Fixing of Heat shrink straight through joint kit for 11kV, 3 core, 150 Sq. mm XLPE aluminium cable as per Technical Specification No. 8	1	No.		
9	Supply at site 630kVA, 11/0.433kV, Dyn11, ONAN Indoor type Distribution Transformer as per Technical Specification No. 9	1	No.		
10	Installation, Testing & Commissioning of 630kVA, 11/0.433kV, Dyn11, ONAN Indoor type Distribution Transformer as per Technical Specification No. 10	1	No.		

11	Supply at site 6-way LT Power Distribution Panel as per Technical Specification No. 11	1	No.		
12	Installation, Testing & Commissioning of 6-way LT Power Distribution Panel as per Technical Specification No. 12	1	No.		
13	Supply at site 1.1kV Single Core 1000 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as per Technical Specification No. 13	70	m		
14	Supply at site 1.1kV Single Core 1000 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as per Technical Specification No. 14	70	m		
15	Supply at site 1.1kV Single Core 1000 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as per Technical Specification No. 15	70	m		
16	Supply at site 1.1kV Single Core 1000 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as per Technical Specification No. 16	70	m		
17	Supply at site 4 Core, 300 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 17	350	m		
18	Supply at site 4 Core, 240 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 18	900	m		
19	Supply at site 4 Core, 50 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 19	3200	m		
20	Supply at site 4 Core, 6 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 20	8500	m		
21	Supply at site 3 core, 1.5 Sq.mm, copper braided PVC sheathed flexible unarmoured cable as per Technical Specification No. 21	7000	m		
22	Supply of 1000mm width hot dip galvanized ladder type cable tray	60	m		

	along with its accessories as per Technical Specification No. 22				
23	Supply of 1000mm width hot dip galvanized Vertical Inside Riser as per Technical Specification No. 23	2	No.		
24	Supply of 1000mm width hot dip galvanized Vertical Outside Riser as per Technical Specification No. 24	2	No.		
25	Supply of 800mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 25	165	m		
26	Supply of 600mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 26	30	m		
27	Supply of 500mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 27	270	m		
28	Supply of 500mm width hot dip galvanized Vertical Inside Riser as per Technical Specification No. 28	2	No.		
29	Supply of 500mm width hot dip galvanized Vertical Outside Riser as per Technical Specification No. 29	2	No.		
30	Supply of 400mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 30	585	m		
31	Supply of 400mm width hot dip galvanized Vertical Inside Riser as per Technical Specification No. 31	6	No.		
32	Supply of 400mm width hot dip galvanized Vertical Outside Riser as per Technical Specification No. 32	6	No.		
33	Supply at site 1200mm Cantilever Bracket for cable tray as per Technical Specification No. 33	60	No.		
34	Supply at site 1000mm Cantilever Bracket for cable tray as per Technical Specification No. 34	165	No.		
35	Supply at site 800mm Cantilever Bracket for cable tray as per Technical Specification No. 35	30	No.		

36	Supply at site 700mm Cantilever Bracket for cable tray as per Technical Specification No. 36	270	No.		
37	Supply at site 600mm Cantilever Bracket for cable tray as per Technical Specification No. 37	585	No.		
38	Fixing of 1200mm Cantilever Bracket as per Technical Specification No. 38	60	No.		
39	Fixing of 1000mm Cantilever Bracket as per Technical Specification No. 39	165	No.		
40	Fixing of 800mm Cantilever Bracket as per Technical Specification No. 40	30	No.		
41	Fixing of 700mm Cantilever Bracket as per Technical Specification No. 41	270	No.		
42	Fixing of 600mm Cantilever Bracket as per Technical Specification No. 42	585	No.		
43	Fixing of 1000mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 43	60	m		
44	Fixing of 1000mm width hot dip galvanized Vertical Inside Riser as per Technical Specification No. 44	2	No.		
45	Fixing of 1000mm width hot dip galvanized Vertical Outside Riser as per Technical Specification No. 45	2	No.		
46	Fixing of 800mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 46	165	m		
47	Fixing of 600mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 47	30	m		
48	Fixing of 500mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 48	270	m		
49	Fixing of 500mm width hot dip galvanized Vertical Inside Riser as per Technical Specification No. 49	2	No.		
50	Fixing of 500mm width hot dip galvanized Vertical Outside Riser as per Technical Specification No. 50	2	No.		

51	Fixing of 400mm width hot dip galvanized ladder type cable tray along with its accessories as per Technical Specification No. 51	585	m		
52	Fixing of 400mm width hot dip galvanized Vertical Inside Riser as per Technical Specification No. 52	6	No.		
53	Fixing of 500mm width hot dip galvanized Vertical Outside Riser as per Technical Specification No. 53	6	No.		
54	Laying double run of 1.1kV 1 Core 1000 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Existing Substation Trench as per Technical Specification No. 54	140	m		
55	Laying of double run of 1.1kV 4 Core 300 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Existing Trench of Substation as per Technical Specification No. 55	40	m		
56	Laying of double run of 1.1kV 4 Core 300 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Existing RCC Trench as per Technical Specification No. 56	40	m		
57	Laying of double run of 1.1kV 4 Core 300 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Cable Tray as per Technical Specification No. 57	42	m		
58	Laying of double run of 1.1kV 4 Core 300 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Vertical Cable Tray as per Technical Specification No. 58	10	m		
59	Laying of double run of 1.1kV 4 Core 300 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as Loop as per Technical Specification No. 59	10	m		
60	Laying of double run of 1.1kV 4 Core 240 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Existing Trench of Substation as per Technical Specification No. 60	40	m		

61	Laying of double run of 1.1kV 4 Core 240 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Existing RCC Trench as per Technical Specification No. 61	40	m		
62	Laying of double run of 1.1kV 4 Core 240 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Cable Tray as per Technical Specification No. 62	216	m		
63	Laying of double run of 1.1kV 4 Core 240 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Vertical Cable Tray as per Technical Specification No. 63	10	m		
64	Laying of double run of 1.1kV 4 Core 240 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through existing NP2 Pipe as per Technical Specification No. 64	80	m		
65	Laying of double run of 1.1kV 4 Core 240 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as Loop as per Technical Specification No. 65	10	m		
66	Laying of 1.1kV 4 Core 50 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Cable Tray as per Technical Specification No. 66	2622	m		
67	Laying of 1.1kV 4 Core 50 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Vertical Cable Tray as per Technical Specification No. 67	96	m		
68	Laying of 1.1kV 4 Core 50 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as Loop as per Technical Specification No. 68	160	m		
69	Laying of 1.1kV 4 Core 6 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Cable Tray as per Technical Specification No. 69	3850	m		
70	Laying of 1.1kV 4 Core 6 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in Vertical	426	m		

	Cable Tray as per Technical Specification No. 70				
71	Laying of 1.1kV 4 Core 6 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through existing NP2 Pipe as per Technical Specification No. 71	180	m		
72	Laying of 1.1kV 4 Core 6 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Clamping on RCC Structure as per Technical Specification No. 72	2149	m		
73	Laying of 1.1kV 4 Core 6 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through existing Hangers in dome shaped roof structure as per Technical Specification No. 73	560	m		
74	Laying of 1.1kV 4 Core 6 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable as Loop as per Technical Specification No. 74	930	m		
75	Supply at site 3 core, 1.5 Sq.mm, copper braided PVC sheathed flexible unarmoured cable as per Technical Specification No. 75	7000	m		
76	Laying of 3 core, 1.5 Sq.mm, copper braided PVC sheathed flexible unarmoured cable on RCC Structure through clamps as per Technical Specification No. 76	165	m		
77	Laying of 3 core, 1.5 Sq.mm, copper braided PVC sheathed flexible unarmoured cable through existing hangers provided in dome shaped roof structure as per Technical Specification No. 77	6600	m		
78	Laying of 3 core, 1.5 Sq.mm, copper braided PVC sheathed flexible unarmoured cable as Loop as per Technical Specification No. 78	165	m		
79	Supply at site LT Load Point Panel (Type – 1) as per Technical Specification No. 79	1	No.		
80	Supply at site LT Load Point Panel (Type – 2) as per Technical Specification No. 80	1	No.		

81	Supply at site FRP 8-Way Power Distribution Board as per Technical Specification No. 81	16	No.		
82	Installation, Testing & Commissioning of LT Load Point Panel (Type – 1) as per Technical Specification No. 82	1	No.		
83	Installation, Testing & Commissioning of LT Load Point Panel (Type – 2) as per Technical Specification No. 83	1	No.		
84	Installation, Testing & Commissioning of FRP 8-Way Power Distribution Board as per Technical Specification No. 84	16	No.		
85	Supply at site FRP Junction Box as per Technical Specification No. 85	425	No.		
86	Fixing of FRP Junction Box as per Technical Specification No. 86	425	No.		
87	Supply at site LED High Bay fitting for inside Shed Area as per Technical Specification No. 87	330	No.		
88	Installation, Testing & Commissioning of LED High Bay fitting as per Technical Specification No. 88	330	No.		
89	Supply at site LED High Bay fitting for Platform Area as per Technical Specification No. 89	252	No.		
90	Installation, Testing & Commissioning of LED High Bay fitting with GI Pipe Bracket as per Technical Specification No. 90	252	No.		
91	Supply at site LED Flood Light fitting as per Technical Specification No. 91	63	No.		
92	Installation, Testing & Commissioning of LED Flood Light fitting as per Technical Specification No. 92	63	No.		
93	Preparation of earthing system with 80mm diameter, 3m GI electrode & chemical back fill compound as per Technical Specification No. 93	6	No.		
94	Preparation of earthing system with 60mm diameter, 3m GI electrode & chemical back fill compound as per Technical Specification No. 94	36	No.		
95	Preparation of earthing system with copper chemical electrode & back fill	2	No.		

	compound for transformer earthing as per Technical Specification No. 95				
96	Supply, Laying, connecting of Copper Strip of 50×5 mm size between earth station to neutral of Transformer as per Technical Specification No. 96	20	m		
97	Supply, Laying, connecting of GI Strip of 50×6 mm size between earth station to the equipment as per Technical Specification No. 97	460	m		
98	Supply, Laying, connecting of GI Strip of 25×6 mm size as per Technical Specification No. 98	2660	m		
99	Supply, Laying, connecting of GI Wire of 8 SWG size as per Technical Specification No. 99	560	m		
100	Shifting of old 1000kVA 11/0.433kV Indoor Type Distribution Transformer as per Technical Specification No. 100	1	No.		
Total					

(In words Rupees _____ only)

(NOTE: The rates should be inclusive of all taxes, duties, fees, cess etc. and all incidental charges; but exclusive of GST).

Signature & Seal of Contractor

Executive Engineer (E)
Deendayal Port Authority

SCOPE OF WORK

Deendayal Port Authority (DPA) is one of the Major Port in India. The Specification is intended to cover the Electrification work for Dome Shaped Godowns (size: 750mx30m & 402mx30m) inside Cargo jetty area at Deendayal Port. The scope of work consists of Supply, installation, testing & commissioning of HT RMU Panel, Distribution Transformer, LT Power Distribution Panels, LT Load Point Panels, LT Power Distribution Boards, LED High Bay Fittings for inside Shed Area, LED High Bay Fittings for Platform Area & LED Flood Light Fittings, Supply & laying of HT & LT XLPE insulated aluminium conductor Cables and LT copper flexible Cables. The work shall be executed to the satisfaction of the Engineer in-Charge. The contractor shall arrange all types of tools, tackles, scaffoldings, temporary power supply at his own cost for installation, testing & commissioning of the work.

TECHNICAL SPECIFICATION

Technical Specification No. 1:

The Gas insulated RMU switchgear shall comply with the requirement stated in the following standard & specification amended up to date.

Metal Enclosed Switchgear	IEC 62271-200/ IEC20 298/IS 12729:1988
Medium Voltage Switch	IEC 265
Alternation Current Dis-connector (Load Break Isolator & Earthing switch)	IEC 60129/ IEC 62271 - 102/ IS 9921
Specification of Alternation Current Breakers	IEC 62271-100/IEC/60056/IS:13118:1991
Panel Design , SF-6 Circuit Breakers	IEC 62271-1/IEC 60694
Current Transformer	IEC 60044-1/IEC 60185/IS 2705:1992
HV switches	IEC 60265/IS 19920:1981
Filling of SF-6 in RMU	IEC 376
Pressure of SF6 gas	1.4 bars at 20 °C
Cable bushings	DIN 47636
Temperature class	-25 °C - +40 °C Indoor
Degree of Protection: - SF6 tank: IP 67 - Front cover: IP 2X - Cable cover:	IEC 60273/IS 13947 (P-1) IP 67 IP 2X IP 3X
Bus bars	240 mm2 Cu
Earth bar (external):	120 mm2 Cu - Bolt dimension: M10

Colour	
Front Cover	RAL 7035
Side & Cable Cover	RAL 7035

- **General Requirement:**

The Ring Main Unit shall be installed at existing 11/0.433 kV Substation inside Cargo Jetty area. The RMU shall be extensible. Two Circuit Breaker for incoming cable and three Circuit breaker for outgoing feeder, shall be enclosed in the main tank using SF6 gas as insulating and vacuum as arc quenching medium or SF6 gas as both insulating and arc quenching medium. The main tank shall be stainless steel sheet of 3mm thickness and robotically welded with a pressure relief arrangement. Incomer as well as Outgoing feeder shall be provided with Energy Meters.

The cable entry shall be from bottom and the end terminations shall be done on front side.

Inner enclosure (Main tank)

The tank shall be robotically welded stainless steel sheet of 3mm thickness. The tank shall be sealed and no handling of gas should be required throughout the 25 years of service life. However, the SF6 gas pressure inside the tank shall be constantly monitored by a temperature compensating gas pressure indicator offering a simple go, no-go indication. The gas pressure indicator shall be provided with green pressure and red pressure zones. There shall be one Non - return valve to fill up the gas. The manufacturer shall give guarantee for maximum leakage rate of SF6 gas will be lower than 0.1% per Year. An absorption material such as activated alumina in the tank shall be provided to absorb the moisture from the SF6 gas to regenerate the SF6 gas following arc interruption. The degree of protection of the inner enclosure shall be IP 67.

The compact RMU Unit shall be provided with a suitable pedestal made up of M.S. Angle to mount the unit. The height of the bottom of cable box shall be minimum 310 mm to provide the turning radius for the HT cable termination.

- **BUS BARS:**

Three nos. of continuous Bus bars made up of EC grade electrolytic copper of rating current 630A shall be provided. The Short time rating current shall be 20kA for 3 seconds for 11kV. The Bus bar connections shall Anti - oxide greased.

ELECTRICAL DATA:

- 12 kV - 28kV - 1min
- Nominal voltage: 11 kV
- Rated frequency: 50 Hz
- Rated current bus bars: 630 A
- Rated current cable switch dis-connector: 630 A
- Short time withstands current:
    - Cable switch dis-connector with interface C (400-bolt) bushing: 21 kA RMS 3 Seconds

- Vacuum circuit breaker with interface C (400-bolt) bushing: 21 kA RMS 3 Seconds
- Rated current for transformer T-off: 630 A
- Impulse withstands voltage: To earth and between phases: 95 kV
- Insulation level: - Power frequency 1 min: 28 kV.

Relay & Protection Scheme:

Numerical Relay with Control Supply 24V DC, 50Hz. Phase current input Relay shall be suitable for 1A and %A CT secondary (selectable at site). Relay shall be suitable for protection core CT connection. Metering core shall be connected to measuring instruments separately. Ground current input Relay shall be suitable for residually connected CT input. The relay shall have provision for digital inputs, speed switch inputs. The Communication System of the relay shall be equipped with RS485 for remote communication or for connection to DCS, SCADA or PLC. The relay shall be suitable for port for connection to Laptop & PC preferably of front side. Relay shall support Modbus Protocol. Relay shall be ABB REF615 / Siemens 7SR.

- **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 RMU in Languages viz. Gujarati, Hindi, English.

TYPE and ROUTINE TESTS:

Type tests:

The equipment offered in the tender should have been successfully type tested at NABL Laboratories in India or ERDA or equivalent international laboratories for the tests in line with the relevant standard and technical specification and manufacture to submit the valid type test certificates.

Following Type Test must have been carried out:

- Short time current withstand test and peak current withstand test.
- Lightening Impulse voltage withstand test.
- Temperature rise test.
- Short Circuit current making and breaking tests.
- Power frequency voltage withstand test (dry).
- Mechanical operation test.
- Checking of degree of protection of main tank and outer enclosure.
- Checking of partial discharge on complete unit.

- **ACCEPTANCE & ROUTINE TESTS:**

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 routine tests are as follows:

1) Conformity with drawings and diagrams,
2) Measurement of closing and opening speeds,
3) Measurement of operating torque,
4) Checking of filling pressure,
5) Checking of gas-tightness,
6) Dielectric testing and main circuit resistance measurement,
7) Power frequency voltage,
8) Resistance test for the circuit,
9) Mechanical operation tests.

The contractor, in the presence of representative of DPA & TPIA, shall carry out all above acceptance and routine tests. The contractor shall give at least 15 days advance intimation to DPA to enable to depute representative for witnessing the tests.

The DPA reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/laboratory or at any other recognized laboratory/research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the DPA to satisfy that the material complies with the intent of this specification.

- **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 triplicate for various items in the RMUs, which are all essentially required for future automation.

i) Schematic diagram of the RMU 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 RMU.
viii) Dimensional drawings of each material used for item (vi).
ix) Actual single line diagram of RMU with or without extra combinations shall be made displayed on the front portion of the RMU 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 type 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:**

Each RMU and its associated equipments 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
- Symmetrical breaking capacity
- Making capacity
- Short time current and its duration
- Purchase Order number and date
- Month and Year of supply

TRAINING:

The contractor shall provide training to Operational Staff and Engineers of DPA. In case of training at manufacturer's works is required, necessary expenses towards boarding, lodging & traveling for the deputed Engineers of DPA shall be borne by DPA.

- **PERFORMANCE GUARANTEE:**

All equipment supplied against this specification shall be guaranteed for a period 12 months from the date of commissioning. However, any engineering error, omission, wrong provision, etc. which do not have any effect on the time period, shall be attended to as and when observed/pointed out without any financial implication on DPA.

The contractor shall supply at site 11 kV, 630 Amp, Indoor Compact Switchgear (Gas Insulated), Extensible on One Side, Motor Driven Spring Charging having 4 nos. Circuit Breaker Modules mentioned as under:
Module No. 1 & 2 as 11 kV Incomer along with PT, Module No. 3 & 4 as Circuit Breaker Module suitable for Distribution Transformer and Module No. 5 as spare 11 kV outgoing feeder.

The Circuit breaker modules shall be supplied with three position isolator/earthing switch, bus bars, interlocking, earth bar and stored spring energy mechanism.

Qty. for each module	**Details of Module No. 1 & 2**
1	Stored energy mech. For manual and Motor Driven Spring Charged operation
1	PT for incomer for metering purpose 11 kV/110 V, Class 0.5
1	Multifunction Energy Meter with RS485
1	Circuit breaker 12 kV, 630 A
1	Control voltage, trip coil 24 V DC
1	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, RS232 port d) Equivalent to CAG 37 for Instantaneous Over Current e) Equivalent to CTUM 15 for short Circuit protection, Inst. Earth fault f) Instantaneous definite time & inverse type protection of over current.
1	Set of three ring core metering & protection CTs: CTs of 300-200/1-1A, 5P10, 2.5VA for protection and 300-200/1-1A CL 0.5, 2.5VA for metering (considering the cable size 3Cx 300 sq. mm HT XLPE cable)
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Relays

Qty. for each module	**Details of Module No. 3, 4 & 5**
1	Stored energy mech. for manual and Motor Driven Spring Charged operation
1	Multifunction Energy Meter with RS485
1	Circuit breaker 12 kV, 630 A
1	Control voltage, trip coil 24 V DC
1	Self-Powered OC+EF Protection Relay
1	Set of three ring core metering & protection CTs: CTs of 150-100/1-1A, 5P10, 2.5VA for protection and 150-100/1-1A CL 0.5, 2.5VA for metering (considering the cable size 3Cx 300 sq. mm HT XLPE cable)
1	Set of Transformer Protection Annunciation Scheme comprising of: 1 no. Master Trip Relay (24VDC) 6 no. Aux. Relays (24VDC) 1 no. 8-Window Annunciator & Hotter Suitable for providing facility for Buchholz/OTI/WTI Alarm/Trip Indication,
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication

1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Electro-Mechanical Aux Relays and Master Trip Relays

In addition to above following material shall be supplied by Contractor for each panel.

Qty.	Material to be supplied by Contractor with each panel
3	Set of Terminal Protector boots for covering cable-termination.
1	Manometer installed on RMU for Gas Pressure indication.
2	Operating handle

Note: The contractor shall provide 5 Years warranty against the low pressure of pre-filled SF6 gas in the RMU from the date of commissioning of RMU.

The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 2:

This item includes installation, testing and commissioning of supplied RMU panel at exiting 11/0.433 kV Substation inside Cargo Jetty area.

The RMU Panel shall be erected by using suitable size of M.S. channel (to be supplied & erected by contractor, as per each module approved foundation drawing) foundation bolts including grouting of the bolts of each Module RMU panel. The RMU panel shall be connected with two separate and distinct earthing system. After installation of RMU panel, necessary test and trial shall be carried out for proper functioning of safety, devices, relay etc. and before charging RMU 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 RMU.

The complete work shall be carried out as directed by Engineer in-Charge. The work includes required labour & material for installations, testing and commissioning of RMU as directed by Engineer-in-Charge.

Technical Specification No. 3:

This item includes supply at site 3 Core, 150 Sq. mm (E), 11kV grade aluminium 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 an 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 5 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. 4:

This item includes laying of single length cable of size 3 Core, 150 Sq. mm XLPE Insulated aluminium conductor armoured cable of 11kV grade in the existing Substation cable trench. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with the existing chequered plates as per original. This includes all required material, tools & tackles and labour as directed by Engineer in-Charge.

Technical Specification No. 5:

This item includes supply at site indoor type heat shrink end termination kit for 3 core, 150 Sq. mm (E), HT armored aluminium conductor XLPE Cable of 11 kV grade as per the approved make list.

Technical Specification No. 6:

This item includes fixing of Indoor type heat shrink end termination kit of 3 Core, 150 Sq. mm size for 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. 7:

This item includes supply at site heat shrink straight through joint kit for 3 core, 150 Sq. mm (E), HT armored aluminum conductor XLPE Cable of 11 kV grade as per the approved make list.

Technical Specification No. 8:

This item includes fixing of heat shrink straight through joint kit for 3 core, 150 Sq. mm HT armored aluminum conductor XLPE Cable of 11 kV grade. This includes all required material,

tools & tackles and labour as directed by Engineer in-Charge.

Technical Specification No. 9:

The item includes supply at site 3 Star rating, 630 kVA, 11/0.433 kV indoor type, three phase, 50 Hz, core type double copper wound oil immersed distribution transformer with on load tap changer, accessories etc. as mentioned below:

The transformer shall confirm to IS 2026 (Part I, II & III): 1977 / IS 1180 (Part 1): 2014 as applicable and transformer oil shall confirm to IS 335 with up to date amendment. The transformer shall have three Star Rating of BEE.

(i)	Capacity	: 630 kVA
(ii)	H.V.	: 11000 Volts
(iii)	L.V.	: 433 Volts
(iv)	Supply System	: 3 phase, 50 Hz
(v)	H.V. winding	: Copper wound delta connected

(vi) L.V. winding : Copper wound star connected having Neutral separately brought out on porcelain bushing for connecting the same to earth.

(vii) Type of cooling : ONAN (Oil immersed with natural air cooled)

(viii) Vector group : Dyn11

(ix) Impedance : Below 5%

(x) Conservator : With sump, drain valve, cover plate and magnetic oil level gauge including minimum oil filling level marking and low level alarm contacts.

(xi) Off load tap : Tap changer shall be changer unidirectional type for voltage variation of - 5% to 12.5% on HT winding in equal steps of 2.5%.

(xii) The transformer shall be provided with the following accessories:

(a) Oil drain valve with plug
(b) Filter valve with plug
(c) Thermometer pocket
(d) Two nos. earthing terminals
(e) Silica gel dehydrating breather
(f) Air release plug
(g) Explosion vent
(h) 4 nos. bidirectional flat rollers
(i) Lifting lugs for main tank and for all items to be handled independently
(j) Rating and terminal marking plate
(k) Buchholz relay, double float type with testing and sampling cocks
(l) 150 mm dial, winding temperature gauge with maximum reading pointer, alarm and trip contacts
(m) 150 mm dial, oil temperature gauge with maximum reading pointer, alarm and trip contacts
(n) Marshalling box
(o) Base channel with towing holes.

(xiii) Temperature rise in oil/winding shall be 50/55 °C above ambient temperature of 45°C.

(xiv) CRCA pressed sheet radiator bank complete with air release plug, drain plug and isolating valve at points of connections with tank.

(xv) Painting:

(a) Internally with oil resisting varnish paint and,

(b) Externally with two coats of zinc rich primer followed by two coats of colour epoxy paint shade no. 631 of IS 5.

Special Conditions for 630 kVA Distribution Transformer

- Maximum Losses at 50% loading at 75ºC (Watts): 1510
- Maximum Losses at 100% loading at 75ºC (Watts): 4300
- Normal Flux Density (at rated voltage and frequency): 1.6 T
- Maximum flux density (Increase of +12.5% combined voltage and frequency variation from rated voltage and frequency: 1.9 T (Max.)
- Maximum current density (A/mm²): 2.8
- Metering CT for LV side: 800/5
- Accuracy Class for metering CT: 0.5 Burden: 20 VA

(1) The transformer shall be double wound, copper coil, oil immersed, naturally cooled (ONAN) and non-sealed type with plain rectangular tank.

(2) The transformer shall be suitable for service with fluctuations in supply voltage up to plus 12.5% to minus 2.5%.

(3) The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment.

(4) All outdoor apparatus, including bushing insulators with their mountings, shall be designed so as to avoid any accumulation of water.

2. Core

- The core shall have low loss and good grain properties. It should be coated with hot oil proof insulation, bolted together with frames to prevent vibration and noise.
- The core thickness should be 0.23mm or less and grade should be M3 or better.
- All core clamping bolts (if any) shall be effectively insulated.
- Only one grade and one thickness of core shall be accepted and mixing of different grades shall not be allowed.
- The complete design of the core must ensure maximum permanency of the core losses without continuous working of the transformers.
- The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated. The vendor shall submit the calculations in support of the same.
- The transformer shall be suitable for continuous service without damage under 'over fluxing' where the ratio of voltage over frequency exceeds the corresponding ratio at rated voltage and rated frequency up to 12.5% and the core shall not get saturated.
- The No Load current shall not exceed 2% of the Full Load current and shall be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no - load current by 5% maximum of full load current.
- The bidder shall be required to submit the following documents in regard to procurement of core material:

  1. Invoice of supplier

2. Mill's test certificate
3. Packing list
4. Bill of landing
5. Bill of entry certificate by custom
6. Description of material, electrical analysis, physical inspection certificate for surface defects, thickness and width of material.

3. The contractor shall offer the core for inspection and approval of DPA during the manufacturing stage. Penalty or black listing shall be imposed on the bidders using defective CRGO sheets.

4. CT terminal box of suitable size made up of Mild Steel and with theft proof locking arrangement for secondary of CT shall be provided on the side of transformer.

5. Box shall be provided with 12 Stud Type terminal blocks (10 + 2 spare) with shorting link.

6. 10 core multi-stranded PVC wire (2.5 sq.mm Cu FRLS PVC stranded panel wires) shall be used to terminate connections from CTs at LV side to the CT terminal box.

7. Plastic ferrules engraved with black letters shall be used to mark the wires coming from CTs.

8. Plastic ferrules engraved with black letters shall be used to mark the wires in the terminal box.

9. Suitable holes with glands to be provided on bottom side of this box as incoming and outgoing for 10 core 2.5 sq.mm cable.

10. CT terminal box shall have IP 55 protection.

11. SURFACE PREPARATION AND PAINTING

The equipment shall be designed & painted for saline weatherproof & should be guaranteed for any type of damage due to harsh climatic condition for 10 Years.

12. RADIO INTEREFENCE

When operated at voltages up to 12.5% in excess of the normal system rating, transformers shall be substantially free from partial discharges (i.e. corona discharges in either internal or external insulation) which are likely to cause interference with radio or telephone communication.

13. OVERLOAD CAPACITY

The transformer shall be suitable for loading as per IS 6600.

The contractor has to provide all test certificates from original manufacturers & relevant sourcing documents. The manufacturer shall have valid BEE certification having Type Test Report (TTR) issued by CPRI/ERDA/International Accredited Laboratory. The type tests report shall be submitted to the Engineer In-charge of the same design.

The contractor shall conduct all routine tests as specified in IS 2026 on the transformer at his own cost at the manufacturer's works in presence of TPIA/representative of DPA and shall submit test report to the Engineer-in-Charge.

The contactor shall submit general arrangement drawing of the transformer. The contractor shall submit the type test certificate of the distribution transformer from any NABL accredited laboratory which shall not be older than 5 years from the date of issue of work order.

Technical Specification No. 10:

This item includes installation, testing and commissioning of 630 kVA, 11/0.433 kV indoor type distribution transformer at existing electrical substation inside cargo jetty area. The transformer shall be installed on prepared pedestal in the substation. Before charging the transformer all the tests shall be carried out as per relevant IS specifications and IE Rules 1956. The transformer shall be properly leveled on foundation including suitable stoppers. The transformer oil shall be tested before transformer is charged and dielectric strength acidity, Sulphur contents shall be in accordance with IS 335 with latest amendments. This includes all material, labour, tools & tackles as directed by Engineer-In-charge.

Technical Specification No. 11:

This item includes design, manufacture, testing & supply at site 6 Way, 1000 Amp, LT Power Distribution Panel suitable for 415V, 3 Phase 4 Wire, 50Hz AC supply system including Switchgears and internal wiring complete in all respect. The LT panel shall be extensible on one side.

The Panel shall be dust and vermin proof, free standing, compartmentalized made from 14 SWG, indoor type, and fabricated from CRCA sheet on robust angle iron frame painted with two coats of Zinc rich primer paint and two coats of colour pigmented epoxy paint shade no. 631 of IS: 5. Before painting the panel, the surface treatment shall be carried out by 7 tank process including degreasing etc.

LT distribution panel shall have Bus-bars which 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 bar of 1000 Amp rating for three Phases and Half the size of Neutral including and PVC sleeving. All the bus bar shall be supported on hylem/epoxy insulator. The Bakelite sheet of 12 mm (Minimum) thickness shall be provided in side enclosure of panel and wherever it is found necessary under relevant IS specification and IER 1956.

The panel shall be provided with metallic engraved labels on front for identification of Incoming & Outgoing feeders.

The neoprene gaskets shall be provided on the periphery of the doors of all feeders.

The sleeved electrolytic copper bus-bars with epoxy insulators with Bakelite support and separators shall be provided with colour code.

All power cables shall enter the switchboard from the bottom on the back of the panel. Sufficient space shall be provided for ease of connection and termination of cables.

Any other electrical component for which details not mentioned but required for operational point of view is to be also considered.

The panel shall be complete in all respect with cable glands, lugs for incoming & outgoing cables along with 2 nos. of earthing terminals.

The panel shall be comprised with following accessories:

1) Main Incomer (1 No.)

The Main Incomer Feeder shall be provided with 1 no. 1000 Amp, 50 kA, 415 Volt, Triple Pole – MDO (Draw out type) ACB (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay with Shunt Trip & under Voltage Coil.

The Digital Multi-Function Energy Meter (accuracy class 0.5) with LCD display shall be provided with parameters like kWh, MD, Voltage of each phase, Line current for each Phase, PF of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time. The Energy Meter shall have RS485/RS232/Ethernet communication port for output.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided.

The 3 Nos. CTs having ratio of 1000/5 Amps, class 1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with incomer & the control wiring shall be done with copper wire.

2) <u>OUTGOING FEEDERS (6 Nos.):</u>

The Outgoing Feeders shall be provided with

(1) 2 No. TPN MCCB, 400 Amp, 415 Volt, 36kA breaking capacity with Microprocessor based

(2) 2 No. TPN MCCB, 250 Amp, 415 Volt, 36kA breaking capacity with Microprocessor based

(3) 2 Nos. TPN MCCB, 200 Amp, 415 Volt, 25 kA breaking capacity with Microprocessor based

Each feeder shall have Digital Multi-Function Energy Meter, Accuracy Class 0.5 for measurement of energy consumption of the feeder with RS485/RS232/Ethernet communication port for output. The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided on each feeder. The control wiring & power wiring shall be done with copper wire properly and the power wiring shall be brought up to the Power terminal block of suitable ampere capacity.

The LT Panel shall be tested as per the relevant IS standard. Before Manufacturing the LT Panel, the relevant test certificate in support of LT distribution 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.

<u>Technical Specification No. 12</u>:

This item includes installation, testing and commissioning of supplied 6-way LT Power Distribution Panel in Substation. The work includes end termination, connection of cables laid between Distribution Transformer's LT side and the LT Power distribution panel including earth connection. This includes necessary mounting hardware for bolting/welding down the base frame to the foundation. All alignment, leveling, grouting, anchoring adjustments shall be carried out in accordance with manufacturer's instruction or as directed by Engineer-in-charge. The work includes termination of the laid Cables along with providing suitable size of lugs, glands and necessary earth linking connection. All connections in Distribution Panel shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment. After installation of the Distribution Panel, testing and commissioning shall be done as directed.

Technical Specification No. 13:

This item includes supply at site 1.1kV grade, Single Core, 1000 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Round Wire Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length. The color of outer sheath shall be Red.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 14:

This item includes supply at site 1.1kV grade, Single Core, 1000 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Round Wire Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length. The color of outer sheath shall be Yellow.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 15:

This item includes supply at site 1.1kV grade, Single Core, 1000 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Round Wire Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length. The color of outer sheath shall be Blue.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 16:

This item includes supply at site 1.1kV grade, Single Core, 1000 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Round Wire Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length. The color of outer sheath shall be Black.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 17:

This item includes supply at site 1.1kV grade, Four Core, 300 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Flat Strip Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 18:

This item includes supply at site 1.1kV grade, Four Core, 240 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Flat Strip Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 19:

This item includes supply at site 1.1kV grade, Four Core, 50 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Flat Strip Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 20:

This item includes supply at site 1.1kV grade, Four Core, 6 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Flat Strip Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 21:

This item includes supply at site 1.1kV grade, Three Core, 1.5 Sq.mm, overall tinned copper braided PVC sheathed flexible unarmoured cable confirming to IS: 694: 2010 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 22:

This item includes supply at site hot dip galvanized steel ladder type cable tray of following size along with its accessories:

Cable Tray:

Ladder Tray Dimension: 1000mm (W) × 100mm (H) × 20mm (C), 2500mm length.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Tray Cover:

Width: Suitable for 1000 mm (width) cable tray,

Thickness: 1 mm, Length: 2500mm, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The ladder type cable tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Cable Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Cable Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of cable tray. The rate shall be inclusive of all the taxes (excluding

GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 23:

This item includes supply at site hot dip galvanized 90-degree Vertical Inside Riser for steel ladder type cable tray of following size along with its accessories:

Inside Riser:

Dimension: 1000mm (W) × 100mm (H) × 20mm (C), Radius: 600mm.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Riser Tray Cover:

Width: Suitable for 1000 mm (width) cable tray riser,

Thickness: 1 mm, Length: As per Inside Riser, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The Riser tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Riser Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Riser Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Riser Tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 24:

This item includes supply at site hot dip galvanized 90-degree Vertical Outside Riser for steel ladder type cable tray of following size along with its accessories:

Inside Riser:

Dimension: 1000mm (W) × 100mm (H) × 20mm (C), Radius: 600mm.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Riser Tray Cover:

Width: Suitable for 1000 mm (width) cable tray riser,

Thickness: 1 mm, Length: As per Outside Riser, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The Riser tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Riser Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Riser Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Riser Tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 25:

This item includes supply at site hot dip galvanized steel ladder type cable tray of following size along with its accessories:

Cable Tray:

Ladder Tray Dimension: 800mm (W) × 100mm (H) × 20mm (C), 2500mm length.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Tray Cover:

Width: Suitable for 800 mm (width) cable tray,

Thickness: 1 mm, Length: 2500mm, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The ladder type cable tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Cable Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Cable Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of cable tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 26:

This item includes supply at site hot dip galvanized steel ladder type cable tray of following size along with its accessories:

Cable Tray:

Ladder Tray Dimension: 600mm (W) × 100mm (H) × 20mm (C), 2500mm length.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Tray Cover:

Width: Suitable for 600 mm (width) cable tray,

Thickness: 1 mm, Length: 2500mm, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The ladder type cable tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Cable Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Cable Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of cable tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 27:

This item includes supply at site hot dip galvanized steel ladder type cable tray of following size along with its accessories:

Cable Tray:

Ladder Tray Dimension: 500mm (W) × 100mm (H) × 20mm (C), 2500mm length.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Tray Cover:

Width: Suitable for 500 mm (width) cable tray,

Thickness: 1 mm, Length: 2500mm, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The ladder type cable tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Cable Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Cable Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of cable tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 28:

This item includes supply at site hot dip galvanized 90-degree Vertical Inside Riser for steel ladder type cable tray of following size along with its accessories:

Inside Riser:

Dimension: 500mm (W) × 100mm (H) × 20mm (C), Radius: 600mm.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Riser Tray Cover:

Width: Suitable for 500 mm (width) cable tray riser,

Thickness: 1 mm, Length: As per Inside Riser, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The Riser tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Riser Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Riser Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Riser Tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 29:

This item includes supply at site hot dip galvanized 90-degree Vertical Outside Riser for steel ladder type cable tray of following size along with its accessories:

Inside Riser:

Dimension: 500mm (W) × 100mm (H) × 20mm (C), Radius: 600mm.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Riser Tray Cover:

Width: Suitable for 500 mm (width) cable tray riser,

Thickness: 1 mm, Length: As per Outside Riser, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The Riser tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Riser Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Riser Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Riser Tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 30:

This item includes supply at site hot dip galvanized steel Ladder Type Cable Tray of following size along with its accessories:

Cable Tray:

Ladder Tray Dimension: 400mm (W) × 100mm (H) × 20mm (C), 2500mm length.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Tray Cover:

Width: Suitable for 400 mm (width) cable tray,

Thickness: 1 mm, Length: 2500mm, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The ladder type cable tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Cable Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Cable Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of cable tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 31:

This item includes supply at site hot dip galvanized 90-degree Vertical Inside Riser for steel ladder type cable tray of following size along with its accessories:

Inside Riser:

Dimension: 400mm (W) × 100mm (H) × 20mm (C), Radius: 600mm.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Riser Tray Cover:

Width: Suitable for 400 mm (width) cable tray riser,

Thickness: 1 mm, Length: As per Inside Riser, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The Riser tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Riser Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Riser Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Riser Tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 32:

This item includes supply at site hot dip galvanized 90-degree Vertical Outside Riser for steel ladder type cable tray of following size along with its accessories:

Inside Riser:

Dimension: 400mm (W) × 100mm (H) × 20mm (C), Radius: 600mm.

Runner: 100mm (H) × 20mm (C) × 2mm (T),

Rung: 40mm (W) × 20mm (C) × 2mm (T),

Distance between Rungs: 250mm.

Riser Tray Cover:

Width: Suitable for 400 mm (width) cable tray riser,

Thickness: 1 mm, Length: As per Outside Riser, Height: 30mm

Coupler Plates:

Coupler Plates shall have 8 holes (4 holes & 4 slots) suitable with tray dimensions. The thickness of the Coupler Plates shall be 3mm.

Hardware:

Sets of M8×25mm long SS304 bolt & nut with two plain washers and one spring washer suitable for coupler plates as per requirement.

The Riser tray shall be made out of minimum 2 mm thick Rolled Sheet Steel. The tray shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the trays shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Riser Tray will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. All materials, hardware components shall function and work properly against deterioration due to the aggressive climate conditions.

The Riser Tray manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Riser Tray. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 33:

This item includes supply at site hot dip galvanized steel Cantilever Bracket Support of size 1200mm (L) x 40mm (W) x 500mm (H) x 50mm (Height of other end of bracket) x 2mm (T). The Cantilever Bracket Support shall be made out of minimum 2 mm thick Rolled Sheet Steel. The support shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the support shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Supports will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. The Support shall function and work properly against deterioration due to the aggressive climate conditions.

The Support manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection. The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Cantilever Bracket Support. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 34:

This item includes supply at site hot dip galvanized steel Cantilever Bracket Support of size 1000mm (L) x 40mm (W) x 500mm (H) x 50mm (Height of other end of bracket) x 2mm (T). The Cantilever Bracket Support shall be made out of minimum 2 mm thick Rolled Sheet Steel. The support shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the support shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Supports will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will

have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. The Support shall function and work properly against deterioration due to the aggressive climate conditions.
The Support manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection. The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Cantilever Bracket Support. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 35:

This item includes supply at site hot dip galvanized steel Cantilever Bracket Support of size 800mm (L) x 40mm (W) x 400mm (H) x 50mm (Height of other end of bracket) x 2mm (T). The Cantilever Bracket Support shall be made out of minimum 2 mm thick Rolled Sheet Steel. The support shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the support shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Supports will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. The Support shall function and work properly against deterioration due to the aggressive climate conditions.
The Support manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection. The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Cantilever Bracket Support. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 36:

This item includes supply at site hot dip galvanized steel Cantilever Bracket Support of size 700mm (L) x 40mm (W) x 400mm (H) x 50mm (Height of other end of bracket) x 2mm (T). The Cantilever Bracket Support shall be made out of minimum 2 mm thick Rolled Sheet Steel. The support shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the support shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Supports will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. The Support shall function and work properly against deterioration due to the aggressive climate conditions.
The Support manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection. The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Cantilever Bracket Support. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 37:

This item includes supply at site hot dip galvanized steel Cantilever Bracket Support of size 600mm (L) x 40mm (W) x 400mm (H) x 50mm (Height of other end of bracket) x 2mm (T). The Cantilever Bracket Support shall be made out of minimum 2 mm thick Rolled Sheet Steel. The support shall be shop fabricated and the fabrication process shall include pressing, punching, slotting, drilling, welding etc. It shall be free from burr & sharp edges. After fabrication, the support shall be Hot Dip Galvanized as per IS 2629: 1989 and coverage as per IS 4759:1984. The minimum thickness of galvanizing shall be 120 microns.

The Supports will be inspected at site and if damage to galvanization is noticed or the thickness of any section with inadequate thickness of galvanization is noticed the same will have to be repair/replaced to the satisfaction of the DPA or Third Party Inspection agency. Site galvanization or site repairs will not be permitted. The Support shall function and work properly against deterioration due to the aggressive climate conditions.

The Support manufacturing & galvanizing unit shall be preferably ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection. The contractor shall take prior approval of drawing from Engineer in-Charge before undertaking manufacturing of Cantilever Bracket Support. The rate shall be inclusive of all the taxes (excluding GST), insurance, packing, forwarding, transportation, unloading at site as directed by Engineer-in-Charge.

Technical Specification No. 38:

This item includes fixing of 1200mm Cantilever Bracket Support on the RCC Structure/ Wall of Shed at a height of approximately 4m. The Cantilever Bracket Support shall be rigidly fixed with three stainless steel expansion Anchor Fasteners of minimum size M10 x 160mm on RCC Structure/ Wall of Shed. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 39:

This item includes fixing of 1000mm Cantilever Bracket Support on the RCC Structure/ Wall of Shed at a height of approximately 4m. The Cantilever Bracket Support shall be rigidly fixed with three stainless steel expansion Anchor Fasteners of minimum size M10 x 160mm on RCC Structure/ Wall of Shed. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 40:

This item includes fixing of 800mm Cantilever Bracket Support on the RCC Structure/ Wall of Shed at a height of approximately 4m. The Cantilever Bracket Support shall be rigidly fixed with three stainless steel expansion Anchor Fasteners of minimum size M10 x 160mm on RCC Structure/ Wall of Shed. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 41:

This item includes fixing of 700mm Cantilever Bracket Support on the RCC Structure/ Wall of Shed at a height of approximately 4m. The Cantilever Bracket Support shall be rigidly fixed with three stainless steel expansion Anchor Fasteners of minimum size M10 x 160mm on RCC Structure/ Wall of Shed. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 42:

This item includes fixing of 600mm Cantilever Bracket Support on the RCC Structure/ Wall of Shed at a height of approximately 4m. The Cantilever Bracket Support shall be rigidly fixed with three stainless steel expansion Anchor Fasteners of minimum size M10 x 160mm on RCC Structure/ Wall of Shed. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 43:

This item includes fixing of 1000mm width Ladder Type Cable Tray along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 44:

This item includes fixing of 1000mm width 90-degree Vertical Inside Riser along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 45:

This item includes fixing of 1000mm width 90-degree Vertical Outside Riser along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 46:

This item includes fixing of 800mm width Ladder Type Cable Tray along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 47:

This item includes fixing of 600mm width Ladder Type Cable Tray along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance

from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 48:

This item includes fixing of 500mm width Ladder Type Cable Tray along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 49:

This item includes fixing of 500mm width 90-degree Vertical Inside Riser along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 50:

This item includes fixing of 500mm width 90-degree Vertical Outside Riser along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 51:

This item includes fixing of 400mm width Ladder Type Cable Tray along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 52:

This item includes fixing of 400mm width 90-degree Vertical Inside Riser along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with

equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 53:

This item includes fixing of 400mm width 90-degree Vertical Outside Riser along with accessories on the Cantilever Bracket Support mounted on wall/structure of Shed. The Tray Cover shall be fixed after completion of work of laying of Cables in the Cable Tray and after getting clearance from Engineer in-Charge. The installation shall be in accordance with equipment manufacturer's instructions, and with best workmanship & best industrial practice to the satisfaction of Engineer in-Charge. This item includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 54:

This item includes laying of double run of 1.1kV Single Core 1000 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable in the existing cable trench of Substation. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with existing chequered plates as per its original condition. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 55:

This item includes laying of double run of 1.1kV Four Core 300 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing cable trench of Substation. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with existing chequered plates as per its original condition. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 56:

This item includes laying of double run of 1.1kV Four Core 300 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing RCC cable trench. The cable shall be laid after opening of RCC trench by removing its cover. Before laying of cable, the RCC cable trench shall be cleaned properly including removal of garbage, dust, etc. from the trench line without damaging other existing cables laying in the trench. After laying of the cable, cable trench shall be properly covered with its existing covers as per original. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 57:

This item includes laying of double run of 1.1kV Four Core 300 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in horizontal cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 58:

This item includes laying of double run of 1.1kV Four Core 300 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in vertical cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 59:

This item includes laying of double run of 1.1kV Four Core 300 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable as Loop. The Loop shall be at both ends of the laid cable as directed by Engineer in-Charge. The cable shall be properly dressed & clamped with suitable clamps as directed by Engineer in-Charge. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 60:

This item includes laying of double run of 1.1kV Four Core 240 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing cable trench of Substation. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with existing chequered plates as per its original condition. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 61:

This item includes laying of double run of 1.1kV Four Core 240 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing RCC cable trench. The cable shall be laid after opening of RCC trench by removing its cover. Before laying of cable, the RCC cable trench shall be cleaned properly including removal of garbage, dust, etc. from the trench line without damaging other existing cables laying in the trench. After laying of the cable, cable trench shall be properly covered with its existing covers as per original. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 62:

This item includes laying of double run of 1.1kV Four Core 240 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in horizontal cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 63:

This item includes laying of double run of 1.1kV Four Core 240 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in vertical cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The

work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 64:

This item includes laying of double run of 1.1kV Four Core 240 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing NP2 Pipe Trench. The cable shall be passed through the existing NP2 pipe after opening & removing RCC trench manhole cover. After laying of the cable, the manhole shall be properly covered with existing removed RCC covers as per its original position. At approximately 31m, 18m & 31m length of NP2 Pipe, a suitable size of manhole will exist. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 65:

This item includes laying of double run of 1.1kV Four Core 240 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable as Loop. The Loop shall be at both ends of the laid cable as directed by Engineer in-Charge. The cable shall be properly dressed & clamped with suitable clamps as directed by Engineer in-Charge. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 66:

This item includes laying of 1.1kV Four Core 50 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in horizontal cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 67:

This item includes laying of 1.1kV Four Core 50 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in vertical cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 68:

This item includes laying of 1.1kV Four Core 50 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable as Loop. The Loop shall be at both ends of the each laid cable as directed by Engineer in-Charge. The cable shall be properly dressed & clamped with suitable clamps as directed by Engineer in-Charge. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 69:

This item includes laying of 1.1kV Four Core 6 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in horizontal cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables

shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 70:

This item includes laying of 1.1kV Four Core 6 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in vertical cable tray installation. The cable shall be properly dressed in such a manner that crossing of cables shall be minimized. The cable shall be clamped with suitable clamps/thick PVC straps at every 1 m distance in cable tray. All cables shall be laid in parallel in side-by-side as directed by Engineer in-Charge. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 71:

This item includes laying of 1.1kV Four Core 6 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing NP2 Pipe Trench. The cable shall be passed through the existing NP2 pipe after opening & removing its cover. After laying of the cable, the trench hole shall be properly covered with existing removed cover as per its original position. At approximately 30m length of the Pipe, a suitable size of trench hole exists. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 72:

This item includes laying of 1.1kV Four Core 6 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable through clamping on RCC lantern/column structure. The G.I. Saddle clamps shall be provided of size 20mm×2mm (size suitable with respect to cable outer diameter) with suitable size of heavy duty screws for clamping as directed. The cable shall be laid on RCC lantern/column structure with clamps at a height of 3.5m to 4m as directed by Engineer in-Charge. The clamp shall be fixed rigidly on lantern/column structure at 0.5m intervals. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in Charge.

Technical Specification No. 73:

This item includes laying of 1.1kV Four Core 6 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable through clamp provided on existing hangers in the dome shaped roof structure of the Shed. A distance between two existing hangers will be approximately 1m. The cable shall be passed & tied/fixed in the clamp provided on existing hanger in the Shed structure as directed by Engineer in-Charge. Contractor shall arrange necessary scaffolding/any other equipment of required height for laying of the cable through existing hangers in the roof structure of the Shed. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 74:

This item includes laying of 1.1kV Four Core 6 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable as Loop. The Loop shall be at both ends of the each laid cable as directed by Engineer in-Charge. The cable shall be properly dressed & clamped with suitable clamps as directed by Engineer in-Charge. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 75:

This item includes supply at site 1.1kV grade, 3 core, 1.5 Sq.mm, overall tinned copper braided PVC sheathed flexible unarmoured Cable conforming to IS 694: 2010 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length.

The contractor shall submit Type Test Report for the type tests conducted in accordance with IS 694: 2010 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory are to be submitted at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 76:

This item includes laying of 1.1kV grade, 3 core, 1.5 Sq.mm, overall tinned copper braided PVC sheathed flexible unarmoured Cable through clamping on RCC structure. The G.I. Saddle clamps shall be provided of size 20mm×2mm (size suitable with respect to cable outer diameter) with suitable size of heavy duty screws for clamping as directed. The cable shall be laid on RCC structure with clamps at a height of approximately 6m as directed by Engineer in-Charge. The clamp shall be fixed rigidly on RCC structure at 0.3m intervals. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 77:

This item includes laying of 1.1kV grade, 3 core, 1.5 Sq.mm, overall tinned copper braided PVC sheathed flexible unarmoured Cable through clamp provided on existing hangers in the dome shaped roof structure of the Shed. A distance between two existing hangers will be approximately 1m. The cable shall be passed & tied/fixed in the clamp provided on existing hanger in the Shed structure as directed by Engineer in-Charge. Contractor shall arrange necessary scaffolding/any other equipment of required height for laying of the cable through existing hangers in the roof structure of the Shed. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 78:

This item includes laying of 1.1kV grade, 3 core, 1.5 Sq.mm, overall tinned copper braided PVC sheathed flexible unarmoured Cable as Loop. The Loop shall be at both ends of the each laid cable as directed by Engineer in-Charge. The cable shall be properly dressed & clamped with suitable clamps as directed by Engineer in-Charge. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 79:

This item includes design, manufacture, testing & supply at site outdoor type Load Point Panel with double door, 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.
- 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 having Protection Class of IP 52.

- 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.
- 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, TPN MCCB, 35kA: 2 No. for Incomer
  2) 400 Amp, TPN Changeover Switch: 1 No.
  3) 63 Amp, TPN MCCB, 25 kA: 10 Nos. (Outgoing Feeder to VTPN)
  4) 63 Amp, TPN MCCB, 25 kA: 1 No. (Spare Outgoing Feeder)
  5) Digital Multi-Function Energy Meter, Accuracy Class 0.5, with RS485: 1 No.
  6) 400/5 Amp CT coil (Class 1) Tape Wound: 3 Nos.
  7) LED Indication lamps for R, Y, B, ON, OFF & Trip indication: 6 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 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.

Technical Specification No. 80:

This item includes design, manufacture, testing & supply at site outdoor type Load Point Panel with double door, 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.
- 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 having Protection Class of IP 52.
- 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.
- 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) 250 Amp, TPN MCCB, 35kA: 2 No. for Incomer
  2) 250 Amp, TPN Changeover Switch: 1 No.
  3) 63 Amp, TPN MCCB, 25 kA: 6 Nos. (Outgoing Feeder to VTPN)
  4) 63 Amp, TPN MCCB, 25 kA: 1 No. (Spare Outgoing Feeder)
  5) Digital Multi-Function Energy Meter, Accuracy Class 0.5, with RS485: 1 No.
  6) 250/5 Amp CT coil (Class 1) Tape Wound: 3 Nos.
  7) LED Indication lamps for R, Y, B, ON, OFF & Trip indication: 6 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 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.

Technical Specification No. 81:

This item includes design, manufacture, testing & supply at site outdoor type FRP Power Distribution Board. The FRP Power Distribution Board shall be outdoor surface mounting type with door, with locking arrangement and top canopy. The Power Distribution Board shall be of suitable size; however, it shall be specious for easy maintenance and the minimum depth of the Feeder Pillar shall be 300mm.

The FRP Power Distribution Board shall have following features:

- The material for the enclosure shall be Fiber Reinforced Polyester (FRP) with F1 grade raw material of ultra-guard.
- Protection Class: IP 65.
- Impact Resistance: IK 10
- Sheet thickness shall be minimum 4 mm.
- Gasket shall be of properly greed with proper compression to maintain the ingress protection.
- Distribution Board shall comply with the requirement of dielectric strength as per IEC62208 standard, ultraviolet resistance test as per UL746C standard and glow wire test with flammability of 5VA as per UL94 standard.
- Distribution Board shall have continuous hinges. All the accessories like hinges, locking arrangement, screws & mounting brackets shall be of SS304 or higher grade SS.
- Distribution Board shall have backside mounting arrangement.
- Distribution Board edges and door edges shall be reinforced against distortion. Cut outs shall be true in shape and devoid of sharp edges.
- The complete structure shall be rigid, self-supporting free from vibration, twists & bends.
- Finished painted appearance of equipment shall present an aesthetically, pleasing appearance, free from dents and uneven surfaces.

The Power Distribution Board shall be provided with following electrical items:

1) Incomer – 63 Amp TPN MCCB, 25 kA, 50Hz: 1 No.
2) Outgoing – 16A, 10kA, TP MCBs, C Curve: 8 Nos.
3) Wiring: Internal with complete wiring with suitable size of flexible copper cable for I/c to O/g, suitably bind with proper gap as per IS.
4) 70A, 415V, 3 phase contactor with coil voltage 215-240 V: 1 No.
5) Digital Timer switch for switching, single phase operated: 1 No.

The Power Distribution Board shall be complete in all respects having interconnection with PVC insulated cable single core, standard copper conductor of 1100V grade. The cable entry and exit shall be from bottom of the Distribution Board.

The Power Distribution Board shall be provided with suitable size of Earthing Busbar. Before placing the order for manufacturing the drawing should be approved by Engineer in-Charge showing the arrangement of the electrical components and should fulfil the needs of IE rules. The Power Distribution Board shall be manufactured from type test certificate holder for Power Distribution Board of similar or above rating.

The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 82:

This item includes installation, testing & commissioning of Load Point Panel (Type – 1). The Load Point Panel shall be installed on base frame made of Stainless Steel (Grade SS 304) angle of size 50mm×5mm with six legs of size 50mm×5mm×800mm each. The panel shall be erected on RCC foundation of suitable size having height of 500mm above ground level and 400mm below ground level. Before RCC, 100mm PCC shall be done. For cable entry & exit, suitable size & length of HDPE Pipe (two for Incomer & eleven for Outgoing Cables) shall be kept in the foundation during its casting as directed by Engineer in-Charge. This work also includes termination of the incoming & outgoing Cables along with providing suitable size of glands (Gland suitable for XLPE aluminium Incoming/outgoing cable size: 4C×300 sq.mm/4C×50Sq.mm) and necessary earth linking connection. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 83:

This item includes installation, testing & commissioning of Load Point Panel (Type – 2). The Load Point Panel shall be installed on base frame made of Stainless Steel (Grade SS 304) angle of size 50mm×5mm with six legs of size 50mm×5mm×800mm each. The panel shall be erected on RCC foundation of suitable size having height of 500mm above ground level and 400mm below ground level. Before RCC, 100mm PCC shall be done. For cable entry & exit, suitable size & length of HDPE Pipe (two for Incomer & eleven for Outgoing Cables) shall be kept in the foundation during its casting as directed by Engineer in-Charge. This work also includes termination of the incoming & outgoing Cables along with providing suitable size of glands (Gland suitable for XLPE aluminium Incoming/outgoing cable size: 4C×240 sq.mm/4C×50 Sq.mm) and necessary earth linking connection. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 84:

This item includes installation, testing & commissioning of Power Distribution Board on wall / structure as directed by Engineer in-Charge. The Distribution Board shall be fixed rigidly on wall through suitable size of anchor fasteners as directed by Engineer in-Charge. This work includes termination of the incoming & outgoing Cables along with providing suitable size of glands (Gland suitable for XLPE aluminium Incoming/outgoing cable size: 4C×50 sq.mm/4C×6 Sq.mm) and necessary earth linking connection. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 85:

This item includes supply at site FRP Junction Box of size 160 mm × 160 mm × 90 mm (W×H×D) along with 9 nos. of 32A capacity Connector duly mounted on DIN rail channel with suitable size of gland for incomer 4 core, 6 Sq.mm XLPE aluminum conductor Cable and PG glands for three outgoing 3 core, 1.5 Sq.mm braided copper flexible cable. The Junction Box shall have ingress protection of IP65. The Junction Box shall be provided with suitable wall mounting bracket. The size of the Junction Box is tentative and minimum. The rate shall be inclusive of all taxes (excluding GST), insurance, transportation, unloading at site as directed by Engineer in-Charge.

Technical Specification No. 86:

This item includes fixing of supplied FRP Junction Box on wall/structure of the Shed at the location as directed. The Junction Box shall be fixed rigidly on wall through suitable size of nut bolts/anchor fasteners, at a height of approximately 6m, as directed. This work includes necessary wiring, connections & earth linking with all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 87:

The contractor shall supply at site LED High Bay fittings to achieve average illumination level of not less than 150 Lux on ground level in a grid of 5m × 5m with uniformity ratio (Emin/Eavg) of 0.40 and maintenance factor of 0.80 inside Storage Shed – I (402m × 30m) & Shed – II (750m × 30m). A drawing is enclosed at Annexure – II for reference. The lighting design of inside Sheds shall comply with IS 3646: (Part II) – 1966 with latest amendments.

The bidder shall submit their illumination design with following details:

(1) Width of inside Storage Shed – I & Shed – II is 30m (Width – Y axis)

(2) Length of inside Storage Shed – I is 402m & Shed – II is 750m (Length – X axis)

(3) Position of LED high bay fittings in width – Y axis of the Shed – I & Shed – II: first fitting at 5.500m, second fitting at 14.900m & third fitting at 25.000m.

(4) Position of LED high bay fittings in length – X axis of the Shed – I (402m × 30m): first group of three fitting at 4.410m and thereafter subsequent group of three fittings at an equal distance of 10.080m up to 40th group of three fittings.

(5) Position of LED high bay fittings in length – X axis of the Shed – II (750m × 30m): first group of three fitting at 5.670m and thereafter subsequent group of three fittings at an equal distance of 10.710m up to 70th group of three fittings.

(6) Mounting height of LED high bay fittings (between Ground level of Shed and surface of the LED high bay fitting's glass) shall not be less than 12.50 m for the middle row of LED high bay fittings and not less than 10.00 m each for side rows of high bay fittings inside both Sheds.

(7) The reflection factor for the Floor, Ceiling & Wall shall not be more than 10.

(8) For Shed – I (402m × 30m) the size of grid shall not be less than 81×7 points and for Shed – II (750m × 30m) the size of grid shall not be less than 151×7 points.

The bidder shall submit their detailed design reports showing the illumination level with total quantity of fittings, maintenance factor & uniformity ratio in a grid of 5m×5m along with their bid document.

The bidder shall submit LM79 test reports of the offered LED High Bay fitting issued by any NABL accredited laboratory only for calculation of power consumption of the design along with the bid document. The LM79 test report shall have ULR Number.

Note: The locations of hangers provided in the roof structure of Storage Sheds by DPA for fixing of LED high bay fittings by the contractor will be as per the details provided at sr. no. 3, 4 & 5 above. However, the exact locations of the hangers are subject to minor change depending on the actual site condition only at Storage Sheds 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.

The Technical Specifications of LED High Bay Fitting is as below:

SR.NO.	DESCRIPTION	SPECIFICATION
1	Input Power of High Bay fitting	**To be offered by bidder**
2	Input voltage AC	120-270 V AC
3	Input Frequency	50 Hz +/-1 Hz
4	Life	50,000 burning hours @ L70B50, Ta 35°C Outdoor
5	Mounting type for High Bay fitting	Eye bolt/Bracket for suspension mounting
6	Total Harmonic Distortion	<10% maximum
7	Working Temperature	0°C to +45°C
8	Working Humidity	10% to 90% RH
9	Temperature	5700K to 6500K
10	Colour rendering index	>70
11	Lumens / Watt	≥ 120 Lumen/Watt at System Level
12	Finishing	Corrosion resistant powder coating
13	Power factor	Not less than 0.95
14	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 Contractor shall promptly, Replace the material against manufacturing defects /Rectify the material, on receiving the instruction from Engineer in-Charge at contractor's cost. The contractor shall have final & total single point responsibility for performance of the LED light fittings supplied.

15	Construction	The housing should be of single piece non-corrosive powder coated pressure die-cast alluminium frame. The weight of the High Bay fitting shall not be more than 8.0 kg.
16	Surge Protection	The Luminaire should have a 10kV SPD. The SPD should be able to sustain a minimum 15 hits of 5kA rating i.e. Total of 45 hits across all the three modes as per IEC 61000.
17	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.
18	Impact Resistance	IK08
19	Driver Construction	The Drivers should be a potted driver not a printed circuit board without casing, mounted inside the luminaire. The Driver shall be of constant current type and shall have Over voltage, Over current, Over temperature & Short circuit Protection. The driver efficiency shall be more than 85%. List of make of Driver: PHILLIPS Xitanium/ MEANWELL/ OSRAM/ BAG/ SOSEN/ INVENTRONICS. 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).
20	Driver shall safety compliance	As per IEC 61347-1/ IS 15885 (Part2/ SEC13)/BIS certified
21	Ingress Protection Level of LED Light Fitting	IP 65 or more
22	Optics	As per Design
23	Material of optics	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. Or Exposed lensed PC Lens plate, the LEDs should be provided with anti-dust, UV resistant exposed lens for avoiding any dust

		& dirt accumulation on the fixtures and yellowing of the lenses.
24	Makes of LEDs	Osram, Cree, Lumileds, Nichia, Seoul.
25	Specification of LED	SMD type with wattage of each LED should be > 1 Watt and ≤ 3 Watt.
26	Certificate/Report	(1) Type test reports for LED fittings & LED Driver. (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, 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 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 (excluding LM79 report) for all LED light fitting at the time of supply of fittings.

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

List of make of LED luminaire: Bajaj/ Philips/ Crompton/ C&S/ SYSKA/ WIPRO/ Pyrotech/ Surya/ Nessa/ Panasonic/ Havells/ Halonix/ Orient Electric/ WMEL.

Field Test for LED High Bay Fittings:

The Contractor shall carry out field test for the illumination level provided for Storage Sheds in the presence of Engineer in-Charge & TPIA. The lux level measurement shall be done by Third Party Inspection Agency (TPIA) (to be engaged & payment shall be made by DPA). The

contractor shall prepare grid of 5m × 5m and mark the measuring points for measurement of lux level by the TPIA as directed by Engineer in-Charge.

The contractor shall demonstrate in the Field Test that their design achieves the average illumination level as below:

Illumination Level at inside Storage Shed – I & II:

An average illumination level shall not be less than 150 Lux on ground level in a grid of 5m × 5m with uniformity ratio (Emin/Eavg) of 0.40 and maintenance factor of 0.80 inside Storage Shed I & II. It is clarified that the measured average lux level at the time of Field Test shall not be less than 187.5 lux.

The illumination level shall be measured inside both Storage Shed – I & Shed – II in a size of 50m × 30m by making a grid of a 5m x 5m covering the entire area at ground level. The location of 50m × 30m inside Storage Shed I & II for the field test will be randomly selected by Engineer in-Charge.

In the event of illumination levels not found as per the requirement, the contractor shall have to carry out the work by replacing the LED high bay fittings installed with other wattage and/or make of LED high bay fittings, at the same locations where hangers are fixed/provided for the LED high bay fittings, at his own cost to complete the work within the stipulated time and as per the requirement. Also, the contractor shall pay compensation to the Deendayal Port Authority for the assessed additional power consumption at an applicable Energy Charges per Unit as per the tariff order for DPA (The present tariff of Energy Charges is ₹5.55 per Unit). Deendayal Port Authority shall not pay anything extra to contractor to achieve the required illumination level. The compensation on account of extra energy consumption shall be calculated as below:

Compensation on account of extra energy consumption = Additional Power of LED High bay (kW) × 12 hours × 365 days × 10 years × (Energy Charges per Unit as per the tariff order for DPA).

Technical Specification No. 88:

This item includes installation, testing & commissioning of supplied LED high bay fitting. The LED high bay fitting shall be fixed on existing hanger by providing required length of SS 304 eye bolt & required accessories complete in all respect as directed by Engineer in-Charge. DPA will provide Hanger duly fixed in the Shed structure for mounting of the LED high bay fitting only. The work includes necessary wiring & connections of LED high bay fitting and 3 core, 1.5 Sq.mm braided copper flexible cable with all required material, scaffolding, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 89:

The contractor shall supply at site LED High Bay fittings to achieve average illumination level of not less than 150 Lux on ground level of platform in grid of 5m × 5m with uniformity ratio (Emin/Eavg) of 0.40 and maintenance factor of 0.80 of Railway Track Platform of Dome shaped storage Shed – I & Shed – II. A drawing is enclosed at Annexure – II for reference. The lighting design at Railway Track Platform area shall comply with relevant IS standard with latest amendments.

The bidder shall submit their illumination design with following details:

(1) The bidder shall submit their common design of Railway Track Platform area for Storage Shed – I & II (750m × 5m) with single row of LED High Bay fittings.

(2) Width of the Platform Area of Shed – I & II shall be taken as 5m (Width – Y axis)

(3) Length of the Platform Area of Shed – I & II is 750m (Length – X axis)

(4) Position of LED High Bay fittings in width – Y axis of the Shed – I & II shall be 1.0 m.

(5) Position of LED High Bay fittings in length – X axis of the Shed – I & II: first fitting at 0.0m and thereafter subsequent fittings at an equal distance of 6.0m.

(6) The mounting height of the LED High Bay fitting (between Ground level of platform and surface of the LED High Bay fitting's glass) shall be 4.5m.

(7) The reflection factor for the Floor, Ceiling & Wall shall be considered as 0.0.

(8) The size of grid shall not be less than 151×2 points.

The bidder shall submit their detailed design reports showing the illumination level with total quantity of fittings, maintenance factor & uniformity ratio in a grid of 5m×5m along with their bid document.

The bidder shall submit LM79 test reports of the offered LED High Bay fitting issued by any NABL accredited laboratory only for calculation of power consumption of the design along with the bid document. The LM79 test report shall have ULR Number.

The Technical Specifications of LED High Bay Fitting is as below:

SR.NO.	DESCRIPTION	SPECIFICATION
1	Input Power	**To be offered by bidder**
2	Input voltage AC	120-270 V AC
3	Input Frequency	50 Hz +/-1 Hz
4	Life	50,000 burning hours @ L70B50, Ta 35°C Outdoor
5	Mounting type	Eye bolt/Bracket for suspension mounting
6	Total Harmonic Distortion	<10% maximum
7	Working Temperature	0°C to +45°C
8	Working Humidity	10% to 90% RH
9	Temperature	5700K to 6500K
10	Colour rendering index	>70
11	Lumens / Watt	≥ 120 Lumen/Watt at System Level
12	Finishing	Corrosion resistant powder coating
13	Power factor	Not less than 0.95
14	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 Contractor shall promptly, Replace the

		material against manufacturing defects /Rectify the material, on receiving the instruction from Engineer in-Charge at contractor's cost. The contractor shall have final & total single point responsibility for performance of the LED light fittings supplied.
15	Construction	The housing should be of single piece non-corrosive powder coated pressure die-cast alluminium frame. The weight of the High Bay fitting shall not be more than 8.0 kg.
16	Surge Protection	The Luminaire should have a 10kV SPD. The SPD should be able to sustain a minimum 15 hits of 5kA rating i.e. Total of 45 hits across all the three modes as per IEC 61000.
17	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.
18	Impact Resistance	IK08
19	Driver Construction	The Drivers should be a potted driver not a printed circuit board without casing, mounted inside the luminaire. The Driver shall be of constant current type and shall have Over voltage, Over current, Over temperature & Short circuit Protection. The driver efficiency shall be more than 85%. List of make of Driver: PHILLIPS Xitanium/ MEANWELL/ OSRAM/ BAG/ SOSEN/ INVENTRONICS. 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).
20	Driver shall safety compliance	As per IEC 61347-1/ IS 15885 (Part2/ SEC13)/BIS certified
21	Ingress Protection Level of LED Light Fitting	IP 65 or more
22	Optics	As per Design

23	Material of optics	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. Or Exposed lensed PC Lens plate, the LEDs should be provided with anti-dust, UV resistant exposed lens for avoiding any dust & dirt accumulation on the fixtures and yellowing of the lenses.
24	Makes of LEDs	Osram, Cree, Lumileds, Nichia, Seoul.
25	Specification of LED	SMD type with wattage of each LED should be > 1 Watt and ≤ 3 Watt.
26	Certificate/Report	(1) Type test reports for LED fittings & LED Driver. (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, 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 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 (excluding LM79 report) for all LED light fitting at the time of supply of fittings.

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

List of make of LED luminaire: Bajaj/ Philips/ Crompton/ C&S/ SYSKA/ WIPRO/ Pyrotech/ Surya/ Nessa/ Panasonic/ Havells/ Halonix/ Orient Electric/ WMEL.

Field Test for LED High Bay Fittings:

The Contractor shall carry out field test for the illumination level provided for Railway Track Platform Area in the presence of Engineer in-Charge & TPIA. The lux level measurement shall be done by Third Party Inspection Agency (TPIA) (to be engaged & payment shall be made by DPA). The contractor shall prepare grid of 5m × 5m and mark the measuring points for measurement of lux level by the TPIA as directed by Engineer in-Charge.

The contractor shall demonstrate in the Field Test that their design achieves the average illumination level as below:

Illumination Level at Railway Track Platform area of Shed – I & II:

An average illumination level shall not be less than 150 Lux on ground level of platform in grid of 5m × 5m with uniformity ratio (Emin/Eavg) of 0.40 and maintenance factor of 0.80 at Railway Track Platform area of Dome shaped storage Shed – I & II. It is clarified that the measured lux level at the time of Field Test shall not be less than 187.5 lux.

The illumination level shall be measured by making a grid of a 5m x 5m in total length of Shed – I.

The illumination level shall be measured in a size of 50m × 5m by making a grid of a 5m x 5m covering the entire area at ground level. The location of 50m × 5m at Shed – I or Shed – II for the field test will be randomly selected by Engineer in-Charge.

In the event of illumination level not found as per the requirement, the contractor shall have to carry out the work by replacing the LED High Bay fittings installed with other wattage and/or make of LED High Bay fittings, at the same locations, at his own cost to complete the work within the stipulated time and as per the requirement. Also, the contractor shall pay compensation to the Deendayal Port Authority for the assessed additional power consumption at an applicable Energy Charges per Unit as per the tariff order for DPA (The present tariff of Energy Charges is ₹5.55 per Unit). Deendayal Port Authority shall not pay anything extra to contractor to achieve the required illumination level. The compensation on account of extra energy consumption shall be calculated as below:

Compensation on account of extra energy consumption = Additional Power of LED High Bay fitting (kW) × 12 hours × 365 days × 10 years × (Energy Charges per Unit as per the tariff order for DPA).

Technical Specification No. 90:

This item includes installation, testing & commissioning of LED High Bay fitting. The LED High Bay fitting shall be fixed on a GI pipe bracket. The contractor shall supply & fix a GI Pipe Bracket. A GI pipe bracket shall be of 1050 mm length made from approximately 50 mm OD and minimum 2 mm thickness Pipe. One end of the GI pipe bracket shall be provided with base plate of size 200mm×200mm×2mm with four holes suitable for fasteners of size M10 for mounting the GI pipe bracket. At other end of the bracket be provided with a suitable hole for fixing the eye bolt. The Pipe Bracket shall be hot dip galvanized as per relevant IS standard with minimum coating thickness of 85 microns. The Galvanising shall be done in single dipping method for better adhesion and life. The GI pipe bracket shall be mounted on a RCC column

structure with 4 nos. of anchor fasteners of size M10×100mm at a required height as per the illumination design. The LED High Bay fitting shall be fixed on the open end of the GI pipe bracket with GI eye bolt. The work includes necessary wiring & connections of LED High Bay fitting from FRP JB with 3 core, 1.5 Sq.mm PVC insulated PVC sheathed Copper Flexible Cable. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 91:

The contractor shall supply at site 200 ± 5% Watt energy efficient LED Flood Light Fitting as per the following Technical Specification:

SR. NO.	DESCRIPTION	SPECIFICATION
1	Input Power	200 ± 5% Watt
2	Input voltage AC	120-270 V AC
3	Input Frequency	50 Hz ± 1 Hz
4	Life	50,000 burning hours @ L70B50, Ta 35°C Outdoor
5	Mounting type	Suitable for wall mounting with bracket
6	Total Harmonic Distortion	<10% maximum
7	Working Temperature	0°C to +45°C
8	Working Humidity	10% to 90% RH
9	Temperature	5700K
10	Colour rendering index	>70
11	Efficacy	≥ 120 Lumen/Watt
12	Finishing	Corrosion resistant powder coating
13	Power factor	Not less than 0.95
14	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 contractor shall promptly, Replace the material against manufacturing defects /Rectify the material, on receiving the instruction from Engineer in Charge at contractor's cost. The contractor shall have final & total single point responsibility for performance of the LED light fitting supplied.
15	Construction	The housing should be of single piece non-corrosive powder coated pressure die-cast aluminum frame with heat resistant toughened clear glass fixed with SS screw. The LED Flood Light shall have its make embossed/engraved on the Fitting.

16	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 5kA rating i.e. Total of 45 hits across all the three modes as per IEC 61000.
17	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.
18	Impact Resistance	IK07
19	Driver Construction	The Drivers should be a potted driver not a printed circuit board without casing, mounted inside the luminaire. The Driver shall be of constant current type and shall have Over voltage, Over current, Over temperature & Short circuit Protection. The driver efficiency shall be more than 85%. List of make of Driver: PHILLIPS Xitanium/ MEANWELL/ OSRAM/ BAG/ SOSEN/ INVENTRONICS. 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).
20	Driver shall safety compliance	As per IEC 61347-1/ IS 15885 (Part2/ SEC13)/BIS certified
21	Ingress Protection Level of LED Light Fitting	IP 65 or more
22	Optics	Asymmetric Wide or Wide Beam Angle
23	Material of optics	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. Or Exposed lensed PC Lens plate, the LEDs should be provided with anti-dust, UV resistant exposed lens for avoiding any dust & dirt accumulation on the fixtures and yellowing of the lenses.
24	Makes of LEDs	Osram, Cree, Lumileds, Nichia, Seoul.
25	Specification of LED	SMD type with wattage of each LED should be > 1 Watt and ≤ 3 Watt.
26	Certificate/Report	(1) Type test reports for LED fitting & LED Driver. (2) 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. (3) 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). (4) BIS Certificate for LED Driver. (5) 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 fittings.

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

List of make of LED Luminaire: Bajaj/ Philips/ Crompton/ C&S/ SYSKA/ WIPRO/ Pyrotech/ Surya/ Nessa/ Panasonic/ Havells/ Halonix/ Orient Electric/ WMEL.

Technical Specification No. 92:

This item covers fixing and commissioning of 200 ±5% Watt LED Flood Light Fitting. The LED Flood Light fitting shall be fixed on wall/structure at a height of approximately 7m of dome shaped Storage Shed as directed by the Engineer in-Charge. The LED flood light fitting shall be fixed on Wall/RCC structure with required size of anchor fasteners as per the instruction manual of OEM or as directed by Engineer in-Charge. The work includes necessary wiring & connections of LED flood light fitting from FRP JB with 3 core, 1.5 Sq.mm PVC insulated PVC sheathed Copper Flexible Cable. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 93:

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 500 mm × 500 mm × 500mm × 50mm (thickness of wall) shall be prepared and a 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. 94:

This item includes preparation of maintenance free earth station by providing 60mm 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 500 mm × 500 mm × 500mm × 50mm (thickness of wall) shall be prepared and a 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. 95:

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 500 mm × 500 mm × 500mm × 50mm (thickness of wall) shall be prepared and a 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. 96:

This item includes supply at site, laying, fixing and connecting of Copper strip of size 50×5 mm from earth station to Distribution Transformer as directed. The copper strip shall be laid from earth station to Distribution 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. 97:

This item includes supply at site, laying, fixing and connection of GI strip of size 50x6 mm from earth station to HT RMU Panel/ Distribution Transformer/ LT Distribution Panel/ LT Load Point Panel/LT Distribution Board as directed. The GI strip shall be laid and clamped suitably on wall/floor/structure or buried in the ground as directed. This work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 98:

This item includes supply at site, laying, fixing and connection of GI strip of size 25×6 mm. The GI strip shall be laid and clamped suitably on wall/floor/structure. The strip shall be connected with the earth station. The GI Saddle clamps shall be provided of size 20mm×2mm with suitable size of heavy duty screws for clamping as directed. The GI strip shall be laid on wall/structure with clamps at a height parallel to the cable tray/cable wall clamping as directed by Engineer in-Charge. The clamp shall be fixed rigidly on wall/structure at 0.5m intervals. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 99:

This item includes supply at site, laying, fixing and connection of 8 SWG GI Wire between GI strip of size 25×6 mm to earthing terminal of FRP Junction Box as directed. The GI Wire shall be laid and clamped suitably on wall/structure at height as directed. The work includes all material, labour, scaffolding, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 100:

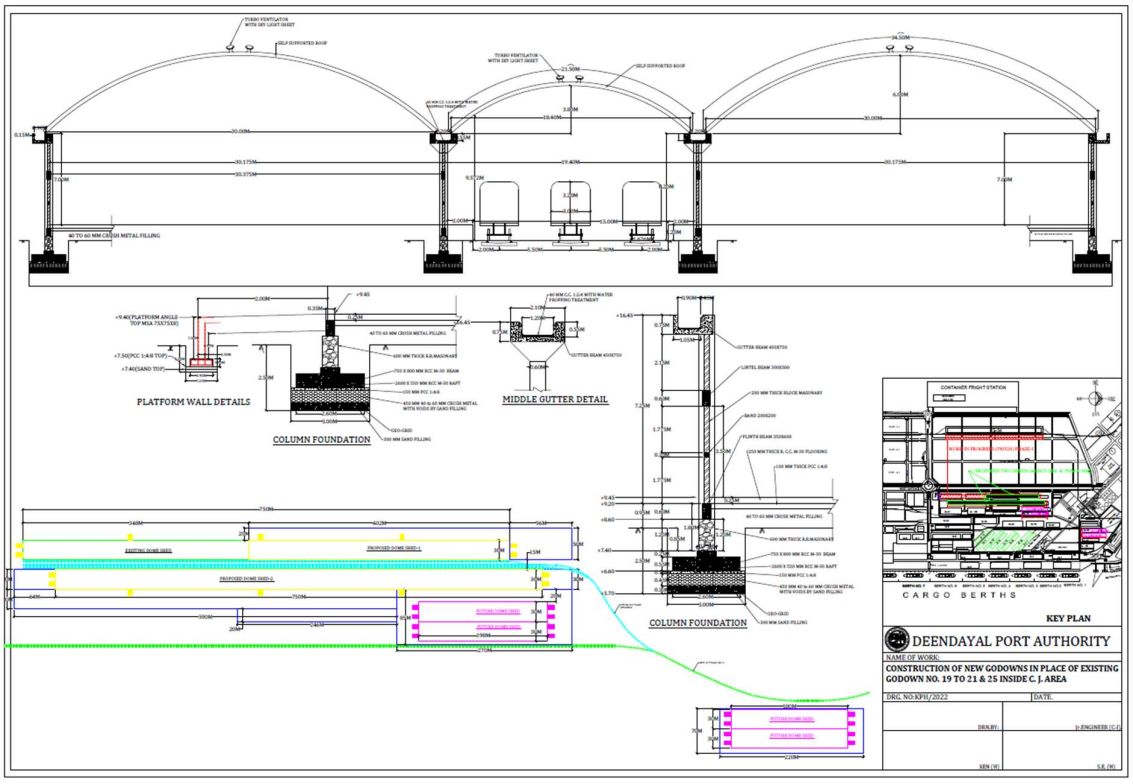
This item covers shifting of old existing 1000kVA 11/0.433kV ONAN indoor type Distribution Transformer from Old NDA Substation, inside Cargo Jetty Area to Main Store, outside Cargo Jetty Area. The contractor shall carry out loading, transportation and unloading of the Distribution Transformer. The work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Signature & Seal of Firm

Executive Engineer (E)
Deendayal Port Authority

ANNEXURE – II

Drawing of Storage Shed in place of existing Godowon No. 19 to 21 & 25 inside C.J. Area:



Make List for Electrical Items		
Sr. No.	**Description**	**Recommended Makes**
1	HV VCB	SIEMENS / CROMPTON GREAVES/ABB/Schneider
1(a)	HV Gas Insulated Breakers	SIEMENS /Schneider/ABB
2	POWER TRANSFORMERS	VOLTAMP/CROMPTON GREAVES /BHARAT BIJLEE/ BHEL/ SIEMENS/ABB/ Schneider/T&R
3	DISTRIBUTION TRANSFORMERS	EMCO/KIRLOSKAR/PATSON/VOLTAMP/ABB/Schneider/T&R
4	RESIN CAST TRANSFORMERS	
	A) RESIN CAST IMPREGNATED	VOLTAMP / KIRLOSKAR / EMCO
	B) DRY CAST	VOLTAMP/KIRLOSKAR/EMCO
5	HT XLPE CABLES	POLYCAB/ TORRENT/ RPG ASIAN/ GLOSTER/ UNISTAR
6	LT XLPE CABLES	POLYCAB/TORRENT/RPG ASIAN/ RALLISON/PRIMECAB/ HAVELLS/ UNISTAR/AVOCAB/ALLCAB/ADCAB
7	LT ACB	SIEMENS/L&T/SCHNEIDER/C&S
8	PROTECTION RELAYS	AREVA/L&T/SIEMENS/ABB/C&S
9	LT PANEL	CPRI APPROVED
10	CHANGE OVER SWITCH	SIEMENS/L&T/ABB/C&S/SCHNIDER/ LEGRAND / INDOASIAN
11	SFU FOR MAIN LT DISTRIBUTION PANELS	SIEMENS/L&T/ABB/C&S
12	SFU FOR DISTRIBUTION PANELS & FEEDER PILLERS	SIEMENS/L&T/ABB/C&S/ SCHNEIDER/ LEGRAND/ INDOASIAN/HAVELLS
13	MCCB FOR MAIN LT DISTRIBUTION PANELS	SIEMENS/L&T/ABB
14	MCCB FOR DISTRIBUTION PANELS AND FEEDER PILLERS	SIEMENS/L&T/ABB/C&S/ SCHNIDER/ LEGRAND/ INDOASIAN/HAVELLS
15	MCB/ELCB/RCCB/ RCCBO FOR MAIN LT DISTRIBUTION PANELS	SIEMENS/HAGER L&T/ABB
16	MCB FOR DISTRIBUTION PANELS AND FEEDER PILLERS	SIEMENS/L&T/ABB/C&S/ SCHNEIDER/ LEGRAND/ INDOASIAN/ HAVELLS/ STANDARD
17	MCB DISTRIBUTION BOARD	STANDARD / HENSEL/LEGRAND / INDOASIAN / HAVELLS
18	MULTI FUNCTION DIGITAL METER FOR MAIN LT DISTRIBUTION PANELS/DIGITAL KWH METERS	L&T/ENERCON/SECURE/L&G/ RISHABH
19	ANALOG VOLT/AMPARE METER FOR DISTRIBUTION PANELS AND FEEDER PILLERS	RISHABH/AE/ENERCON/L&T
20	SLECTOR SWITCH FOR VOLTMETER/AMPARE METER	L&T/SIEMENS/C&S

21	POWER CONTACTOR & OVER LOAD RELAYS	L&T/SIEMENS/ABB
22	QUARTZ TIME CLOCK SWITCH	L&T/INDOASIAN/SIEMENS
23	PVC WIRE WITH COPPER CONDUCTOR	RRKABEL/KEI/POLYCAB/MILEX/GUJCAB/ STANDARD/ FINOLEX/ ANCHOR
24	FLUSH TYPE SWITCHES, SOCKETS, HOLDERS AND CEILING ROSES & ELECTRONIC REGULATORS	ANCHOR/MK/NORTHWEST/VINAY/PANAMA/HAVELLS
25	DOOR BELLS/CALL BELLS	ANCHOR/LEGEND/MK/NORTHWEST
26	MODULAR SWITCHES, SOCKETS, PLATES & BOXES	ANCHOR / MK / NORTHWEST / LEGRAND /HAVELLS/ INDOASIAN/ SIEMENS
27	PVC CONDUIT/OVAL CONDUIT & CASSING CAPPING AND ACCESSORIES	PRECISION/VULCAN/FINOLEX/ GARWARE/ RESTOPLAST/ SWASTIK/ BPI
28	GLS LAMPS & FLUORESCENT LAMPS	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI /GE
29	HPSV, HPMV & METAL HELIDE LAMPS	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI /GE
30	IGNITORS FOR HPSV, METAL HELIDE LAMPS	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI /GE
31	LUMINARIES	PHILIPS/BAJAJ/WIPRO/CROMPTON GREAVES / OSRAM / SURYA ROSHNI /GE
31a	LED Luminaries	Philips /Bajaj/Wipro/CG/Surya/Pyrotech/Syska/Nessa having surge Protection ≥10KV for fittings & internal Surge protection for Driver of≥4KV, LED Chip only OSRAM/CREE/Philips Lumileds/Citizen/Nicia with LM-79,80 CERTIFICATION
32	CEILING FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
33	WALL MOUNTING FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
34	EXHUAST FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
35	HEAVY DUTY INDUSTRIAL WALL MOUNTING FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
36	WATER COOLER	VOLTAS/SHRIRAM USHA/BLUE STAR
37	AIR CONDITIONERS	VOLTAS/CARRIER/BLUESTAR/USHA/ HITACHI/LG/ SAMSUNG/ONIDA

38	REFRIGERATORS	VOLTAS/CARRIER/BLUESTAR/USHA/ HITACHI/LG/ SAMSUNG/WHIRLPOOL
39	VOLTAGE STABILIZER	VEELINE / CAPRI
40	INVERTERS	SUKAM / MICROTEK
41	D.G. SETS (a) ENGINE (b) ALTERNATOR	CUMMINS/GREAVES/KIRLOSKAR/ CATERPILLAR/ ASHOK LEYLAND/VOLVO STAMFORD/CROMPTON GREAVES /JYOTI/ KIRLOSKAR ELECTRIC
42	ELECTRIC MOTOR	ALSTOM/CROMPTON GREAVES /SIEMENS/ KIRLOSKAR/ABB
43	WATER PUMPS	SWASTIK / KSB
44	WATER GEYSER	BAJAJ/USHA / CROMPTON GREAVES / SPHEREHOT / RACOLD
45	LUGS & CABLE GLANDS	DOWELLS / JAINSON / BRACO

TERMS AND CONDITIONS

1. Time Schedule: The work shall be completed within 6 (six) months from the date of issue of Work Order.

2. The employer will award the work to the bidder whose bid has been evaluated to be techno – commercially responsive and the lowest evaluated amount bid as per the following Power Loading Criteria subject to submission of agreement and performance security.

Evaluation of Price Bid:

The DPA do not bind itself to accept the lowest or any tender and reserve the right to accept any tender in part or to reject any tender without assigning any reason thereof. However, DPA reserves the right to reject any or all bids without assigning any reason thereof. Decision of DPA in deciding total amount of financial loading shall be final and binding upon the bidder and DPA will under no obligation to disclose or share working with the bidder.

(1) Financial evaluation of technically qualified bids shall be done as per the following:

(a) The Power Consumption of the LED High Bay fittings offered by each of the technically qualified bids, as measured & certified in the LM79 test reports submitted in the bid issued by any NABL accredited laboratory only will be considered for calculating the Input power for that Bid.

Input Power for a Bid = {Power consumption of LED High bay fitting for inside Shed Area × (Total Quantity of High bay fitting in design = 330} + {Power consumption of LED High Bay fitting for Platform Area × (Total Quantity of High Bay fitting in design = 252)} + {Power consumption of LED Flood Light fitting × (Total Quantity of Flood Light fitting = 63)}

(b) Input Power of the Bid having the lowest Input Power value shall form the "Base" of the power loading calculations.

(c) The difference in Input Power for a Bid with respect to the "Base" shall be calculated for each technically qualified Bid. The expenditure cost on account of extra energy consumption due to difference in Input Power shall be loaded for each technically qualified bid as below:

Extra Energy Expenditure Cost = Difference in Input Power with respect to Base (kW) X 12 hours X 365 days X 5 years X Prevailing Tariff at DPA (which is at present ₹5.55)

(For example, if there are 3 technically qualified bids having input power of 80kW, 90kW and 100kW respectively then 80kW shall become the Base. The prices of the bids having input powers 90kW and 100kW shall be loaded considering a difference in Input Power of 10kW and 20kW respectively).

(d) This extra energy expenditure cost due to difference in Input Power for each Bid shall be added to the price bid of that Bid to arrive at Final Evaluated Price.
Final evaluated price of the Bid = Amount quoted in the Price Bid + Extra Energy Expenditure cost.

(e) This Final Evaluated Price bid by each Bidder shall be considered for evaluating the Lowest Offer.

3. Bidder should have legally enforceable undertaking jointly executed by himself and the Manufacturer/Authorized Channel Partner of LED High Bay/Flood Light Fittings for satisfactory design, manufacture, supply, installation, testing, commissioning and performance including all warranty obligations as per Technical Specification, General & Special conditions of Contract.

4. Bidder shall submit their detailed illumination design report for Storage Shed I & II, as per the details provided in the Technical Specification, showing the illumination level at ground level with quantity of LED high bay fittings, Position of LED high bay fittings in width & length of the Shed, Mounting height of LED high bay fittings, maintenance factor, reflection factor & uniformity ratio (Emin/Eavg) in a grid of 5m×5m (For Shed – I (402m × 30m) size of grid shall not be less than 81×7 points and for Shed – II (750m × 30m) size of grid shall not be less than 151×7 points). Deendayal Port Authority reserves the right to reject the alternative design/offer of the bidder at DPA's sole discretion.

5. Bidder shall submit their detailed illumination design report for Platform Area of Storage Shed I & II, as per the details provided in the Technical Specification, showing the illumination level at ground level of platform with quantity of LED high bay fittings, Position of LED high bay fittings in width & length of the Platform, Mounting height of LED high bay fittings, maintenance factor, reflection factor & uniformity ratio (Emin/Eavg) in a grid of 5m×5m (size of grid shall not be less than 151×2 points). Deendayal Port Authority reserves the right to reject the alternative design/offer of the bidder at DPA's sole discretion.

6. The bidder shall submit LM79 test reports of (1) offered LED High bay fitting for inside Shed Area, (2) LED High Bay fitting for Platform Area & (3) LED Flood Light fitting issued by any NABL accredited laboratory only for calculation of power consumption of the design along with the bid document. The LM79 test reports shall have ULR Number.

7. The contractor shall install display board at site of work indicating the details of the work such as name of the work, name of contractor, scheduled date of start & completion of work, value of work etc. at his own cost.

8. The bidder, at his own responsibility and risk is encouraged to visit and examine the site of work and its surroundings and obtain all information that may be necessary for preparing the Bid. The costs of visiting the site shall be at the Bidders' own expense.

9. DPA will award the work to the bidder whose bid has been evaluated to be techno – commercially responsive and the lowest evaluated amount bid.

10. Work shall be guaranteed for 12 months from the date of completion of the work.

11. The rates should be quoted in figures and words both. In case of difference in figure & words, the rate mentioned in words will be considered.

12. The contractor shall affix SEAL along with SIGNATURE in the Offer.

13. The work shall be carried out in accordance with the best standards of workmanship and to the entire satisfaction of the Engineer in-Charge.

14. Security Deposit @ 5% recovered from the bill and the SD can be released only after successful completion of guarantee period.

15. Payments Terms:

    i) 70% payment will be released after receipt of material at site in good condition, after obtaining insurance cover as per tender condition and after inspection &

certification of the same by Third Party Inspection Agency appointed by DPT and after inspection & acceptance of material by DPT.

ii) 20% of item rate after completion of erection, installation, testing and commissioning etc. and 90% of item rate for item covers only laying/fixing etc. (TPI appointed then after inspection & certification of the same by Third Party Inspection Agency).

iii) 10% will be released after successful completion of whole work (TPI appointed then after inspection & certification of the same by Third Party Inspection Agency) and handing over to DPT.

All payments shall be made in Indian rupees unless specifically mentioned

16. Payment will be made by RTGS only after satisfactory completion of work and submission of duly signed bill.

17. The contractor shall not deposit any materials at such a place that may cause inconvenience to the public or staff or nearby offices.

18. The Contractor shall execute the work in such a way that not to cause inconvenience to the public or staff or nearby offices and not to cause hindrance to traffic. Necessary barricading shall be done by the contractor at his own cost if required.

19. Income-tax and surcharge as applicable will be deducted from the bill while making payment to the contractor for carrying out the work and only net amount shall be paid to the contractor.

20. All tools, plants, scaffolding, ladder etc. and other machinery etc. required temporary for the purpose of execution of work will have to be arranged by the contractor at his own cost and storing of such tools, plants etc. will have to be made by him.

21. All the materials should be got approved from Engineer-in-Charge before put into use.

22. Correction if any should be signed / initialed by the contractor. White ink correction will not be allowed and lead to rejection of quotation.

23. All the rules and regulations governing DPA will be applicable.

24. After completion of the work, the site should be neatly cleaned by the contractor.

25. The contractor shall ensure not to cause any damages to the port properties in the vicinity of work site during execution of work. If any damage occurs due to workmen/ machinery of the contractor, the contractor has to make good the loss / damage at his cost.

26. For Entry & exist of material and contractor personnel, pass shall be arranged by contractor.

27. The contractor shall quote the price exclusive of GST. The contractor shall quote prevailing GST rate separately, which shall be reimbursed by DPA after ascertaining necessary compliance as per Goods & Service Tax, 2017. All other duties, taxes, cesses applicable if any, shall be borne by the contractor.

    Income-Tax deductions and surcharge as applicable thereon shall be made good while making payments due to the contractor for carrying out the work and only net amount shall be paid as directed by the Central Board of Direct Taxes, Ministry of Finance, Government of India.

    The rates quoted by the contractor shall be deemed to be inclusive of the taxes, duties etc. which the contractor will have to pay for the performance of this contract, except

GST. The employer will perform such duties in regard to the deduction of such taxes at sources as per applicable law.

28. All the work shall be carried out to the entire satisfaction of Engineer in-Charge.

Signature & Seal of Firm

Executive Engineer (E)
Deendayal Port Authority