ODISHA POWER TRANSMISSION CORPORATION LIMITED

PACKAGE: CPC - 06/2023-24

Engineering, Supply, Erection, Testing , Commissioning and Connectivity of the existing 33kV & 11kV UG Cabling System with the upcoming 132/33kV GIS GRID & 33/11kV GIS PSS in JANPATH of BTCD Area in Bhubaneswar in the state of Odisha On Turnkey Contract Basis

VOL-II-SECTION-I

SCOPE OF WORKS

NOTICE INVITING TENDER-NIT NO. CPC-06/2023-24

TENDER SPECIFICATION NO:Sr.GM-CPC-E-TENDER-SCRIPS-UG CABLING JANPATH-06/2023-24

IMPORTANT NOTE

THE BIDDERS ARE ADVISED TO VISIT THE SITE BEFORE QUOTING THE BID. THEY SHALL ASCERTAIN ALL THE AVAILABLE DATA FOR TURNKEY COMPLETION OF UG CABLING WORK SUCH AS:-

1. **THE LOCATION OF THE PROPOSED SITE**
2. **SOIL BEARING CAPABILITY.**
3. **BENCHING AND FILLING FOR SITE LEVELLING.**
4. ~~**TYPE OF STRUCTURES FOR TRANSMISSION LINE.**~~
5. **QUANTITY OF MATERIALS/STRUCTURES/EQUIPMENT.**
6. **TYPE OF FOUNDATIONS FOR ~~LINE TOWERS~~ & SUB STATION EQUIPMENT/ STRUCTURES.**
7. **33 KV & 11KV UG CABLING.**
8. **ANY OTHER DATA REQUIRED FOR UG CABLING.**
9. **ANY VARIATION IN QUANTITY WITH RESPECT TO THE BPS/BOQ SHALL BE DEALT WITH AS PER CLAUSE 21.0 "DEVIATION TO THE SCOPE OF WORKS" IN SBD OF VOL-1 OF THE BID DOCUMENT (GENERAL CONDITIONS OF CONTRACT (GCC).**

SCOPE OF WORK:-

1. General

The Employer OPTCL **(**M/S ODISHA POWER TRANSMISSION CORPOTATION LIMITED) is strengthening their Transmission and Distribution systems by way of constructing the following sub-station & bay extensions at Sub-station, Transmission line & associated system at different location in Odisha.

PACKAGE 06/2023-24:

Engineering, Supply, Erection, Testing and Commissioning of (a) 33kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS Grid (Satyanagar) & GIS PSS (Bapujinagar near Adivasi ground, Shantipalli near Maharshi College, Satyanagar New near Railway Washing shed, Kharavel nagar back side of RBI and Master canteen back side of Reliance mart) (b) 11kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS PSS in Bhubaneswar in the state of Odisha on Turnkey CONTRACT BASIS

The indicative layout diagram & SLD of the bay extension work is enclosed ***in the drawing folder in Vol-II***. The works are to be carried out on **EPC/Turnkey CONTRACT BASIS** till final commissioning, its testing, commissioning and handing over the same to the owner.

The scope of the work includes:-

(**i**) Bidders are requested to visit the site before quoting the bid. The scope of work is not limiting to the respective bidding proposal sheet (BPS, Price schedule).

(ii) In Case any work, which is not included in the BPS, but required for completion of project, to be decided as per the terms and conditions of the Standard Bid Document (SBD).

(iii) Design, engineering, manufacture, supply, erection, testing & commissioning of (a) 33kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS Grid (Satyanagar) & GIS PSS (Bapujinagar near Adivasi ground, Shantipalli near Maharshi College, Satyanagar New near Railway Washing shed, Kharavel nagar back side of RBI and Master canteen back side of Reliance mart) (b) 11kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS PSS, as detailed in the specifications and schedule of quantities and in subsequent.

(v) Execution of all civil works as per schedule for erection of Tower column (S/S), Tower(Line), equipment foundation(S/S), construction of earth mat, cable trench, drainage system, Fencing etc.

(vi) Erection, testing, commissioning of all equipment and handing over in all respect as per approved scheme and to the satisfaction of the TPCODL including statutory inspection.

(vii) The makes of the equipment/components/materials shall be from valid OPTCL approve vendor list indicated in this tender and to be approved by the employer before placement of the order on the vendor/manufacturer.

(viii) The contractor(s) shall arrange power supply for construction of the project. The expenditure for such arrangement till completion of the project shall be to the contractor(s) account.

(ix) The contractor(s) shall arrange clean water for construction and curing to the civil works.

(x) The work as mentioned in the price schedule shall be considered for the evaluation of the bid.

(xi) The contractor shall arrange for security of all the materials including owner supply materials (handed over to him) that are required for successful completion of the project till final handing over of the entire work to TPCODL.

(xii) Contractor has to obtain Project License in respect of the projects from the Secretary, Electrical Licensing Board of Orissa at his own cost, prior to commencement of works.

(xiii) The contractor shall supply one official copy of each **Standard** listed in the appropriate schedule.

The contractor shall be fully responsible for providing all equipment, material, systems and services which are required to complete the construction and successful commissioning of the works in all respects**.** The Contractor shall also refer to the Technical Specification (Vol.-II), for proper understanding of the works involved in respect of each substation.

2.0 BRIEF SCOPE OF WORK:-

The scope of work on EPC/Turnkey CONTRACT BASIS includes design, engineering, manufacture, type testing, (factory testing) supply on FOR destination site basis, transportation, handling, storage at site, erection, site testing, commissioning complete in all respects and maintenance of plant and equipment until handing over of works in accordance with Conditions of Contract and the stipulations under various chapters of this specification at the prices stated in the Price Schedule for the following.

PACKAGE- 06/2023-24:

Scope of Works :

(a) 33kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS Grid (Satyanagar) & GIS PSS (Bapujinagar near Adivasi ground, Shantipalli near Maharshi College, Satyanagar New near Railway Washing shed, Kharavel nagar back side of RBI and Master canteen back side of Reliance mart)

(b) 11kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS PSS

i)	Supply of all equipment & materials for ~~the bay extension~~ & underground cabling work.
ii)	Detail designing ~~of the bay~~ & underground cabling work.
iii)	Providing engineering data and drawings, as per specified format, for employer's review, approval and records.
iv)	Complete Manufacturing including Type, Acceptance & Routine testing, as specified & as per IEC/IS standard.
v)	Packing and transportation from the manufacturer's works to the site including transit insurance & customs clearance/ port clearance (if required), port handling, clearance for imported goods and further loading (if applicable)" As delivered at site basis"
vi)	Receipt, Unloading, Storage, Insurance and Preservation of Sub-station & Transmission Line equipment, material & accessories etc at site.
vii)	Execution of all civil works as per schedule for erection of (Tower column (S/S), Tower(Line), equipment foundation(S/S), construction of earth mat, cable trench, drainage system, control room building, boundary wall on the property line of sub-station, installation of switchyard kiosk, Firefighting system, Fencing etc)
viii)	Erection, testing, commissioning of all equipment & UG cabling system and handing over in all respect as per approved scheme and to the satisfaction of the Employer including statutory inspection.
x)	**Name of the work**: **Engineering, Supply, Erection, Testing , Commissioning and Connectivity of the existing 33kV & 11kV UG Cabling System with the upcoming 132/33kV GIS GRID & 33/11kV GIS PSS in JANPATH of BTCD Area in Bhubaneswar in the state of Odisha On Turnkey Contract Basis.** Detail Scope as below:

	(a) 33kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS Grid (Satyanagar) & GIS PSS (Bapujinagar near Adivasi ground, Shantipalli near Maharshi College, Satyanagar New near Railway Washing shed, Kharavel nagar back side of RBI and Master canteen back side of Reliance mart) (b) 11kV UG Cable connectivity from Shorting Points in & around Janpath to respective GIS PSS **A) Details of Provisions to be kept in the Sub-station are as follows:** 1. 33kV 1C x 400 sqmm, Al, XLPE Insulated Armour (Extruded Type) UG Cable as per Approved scheme: 34.75 km 2. 11kV 3C x 400 sqmm, Al, XLPE armoured UG Cable as per Approved scheme: 9.94 km 3. 11kV 3C x120 sqmm, Al, XLPE armoured UG Cable as per Approved scheme: 0.24 km 4. 12Core fibre optic cable (Single mode duct type fibre armoured) as per approved scheme: 4.15 km 5. HDPE PLB Duct: 4.13 km 6. HDPE Pipe 160 mm PE 80-PN8: 9.41 km 7. 33kV DP: 9 nos. 8. 11kV DP: 1 no. **(**B**) Others** **(1) Settlement of all issues related to right of Way & responsibilities of acquiring Right of Way (ROW) lies with contractor at his risk and cost**. **(2) Responsibilities of getting clearance from Railway (if applicable), NHAI (if applicable), Forest (if applicable), Water and other Statutory/Govt. bodies lie with the contractor at his risk and cost (except payment of statutory fees).** **(3)** Testing and commissioning of 33 KV & 11kV UG cable & accessories. **(4)** Handing over of the completed system to the Owner including materials reconciliation with closure proposal.
xiv)	**Time is the essence of the contract. All the work as indicated in the Price Schedule shall be in the PERT Chart for approval by the authority at the beginning of contract.** Satisfactory conclusion of the Contract.

Note:

i. The aforesaid scope of work is only indicative.
ii. The detailed scope of package(s) / works is given in Volume-II
iii. The detailed BOQ (Bill of Quantity) is given in the Price schedule.

2.1. UG Cabling Work

1. 33**KV XLPE UG cable**

2. 11kV XLPE UG cable

3. **Civil works**

The design, engineering, supply of all materials including cement and steel, consumables, as per specification and approved drawings for civil works of the UG cabling works including all types of related works but not limited to the following:

(a) Design of Cable Trench for laying of 33 KV & 11KV XLPE cable (Double circuit) along with OFC.

3. Electrical System Data of 400/220/132/33

1.	Nominal System Voltage (KV)	400/220/132/33
2.	Highest System Voltage (kV)	420/245/145/36
3.	System Neutral Earthing.	Effectively earthed
4.	Basic Insulation Level (kVP)	
	i) Bus	1425/1050/650/170
	ii) Equipment other than Transformer	1425/1050/650/170
	iii) Transformer	1050/650/170
5.	Power Frequency withstand voltage (KV rms)	520/460/275/80
6.	System fault level KA	63/40/40/≠25
7.	Creepage distance for insulators (mm)	10500/6125/3625/900
8.	Min. recommended clearance in air (mm) as per CBIP	
	i) Phase-to-phase	3900/2160/1300/320
	ii) Phase-to-earth	3400/2160/1300/320
	iii) Sectional clearance	6500/5000/4000/3000
9.	Min. ground clearance (as per IE Rules)	8000/5500/5000/4000
10.	Bus configuration for 400/220/132/33 kV	
	Selection of ACSR conductor shall be Chosen from Moose, Zebra and panther as per requirement and decision of employer.	
11.	Phase-to-phase distance:	
	i) Along the bay (mm)	7000/4500//3000/1500
	ii) Strung bus (mm)	7000/4500/3000/1500
12.	Reference design temperature	50 Deg. Centigrade.

Detailed technical particulars of different equipment have been specified in the respective specifications in the subsequent section. If any technical particulars are missed from this volume the same may please be referred from relevant IS: specification for bidding purpose.

4. Design work

The Bidder shall furnish detailed design of the 33kV & 11kV UG cabling work. The design work shall include but not limited to technical calculations, preparation of drawings and bill of materials and specifying equipment not specified in the specification but necessary for the completion of the substation & transmission lines on the turnkey basis. The technical calculation design drawings, etc. shall be submitted to the Employer for approval. However the layout drawing furnished by OPTCL shall be taken as a guide line.

5. Standards

All materials and equipments shall generally comply in all respects with the latest edition of the relevant Indian Standards. International Electro-Technical Commission (IEC) or any other internationally accepted Standard equivalent or better than relevant Indian Standard. Equipment complying with all other authoritative standards such as British, ASA, VDE, etc. will also be considered if performance equivalent or superior to Indian Standard is ensured.

In the event of supply of equipment confirming to any International or internationally recognized Standard other than the Standard listed in the Specification. The salient features of comparison shall be brought out and furnished along with the bid.

In case of adopting any standard other than that IS or IEC, a complete set of adopted standard shall be supplied by the bidder. However it is desirable and preferred that the equipment offered shall comply with one consistent set of standard unless other than exceptional cases.

The equipment shall also comply with the latest revision of Indian Electricity Act and Indian Electricity Rules and any other Electrical Statutory Provision, Rules and Regulations.

6. Reference Drawings

Drawings showing indicating scope of work are enclosed. Drawings are complementary to specifications and shall be referred to for better understanding as well as for estimation of quantities and bill of materials for arising at lump sum bid price on turnkey basis.

The bidder shall submit with the tender, plan of the UG cabling works showing broadly the scope of work incorporated as per technical specification. All the drawings shall be submitted in quadruplicate, enumerated in conformity with relevant clause stipulated in the Technical Section.

These drawings shall show proposed layout plan with section. Drawings showing overall dimension, clearance etc. required for assembling and dismantling and space requirements of all the apparatus are to be supplied to enable the Employer to examine the design and layout at the installation.

7. Packing and Marking

The bidder shall include and provide for securely protecting and packing the plant so as to avoid damage in transit under proper condition and shall be responsible for all loss or damage caused by any defect in packing.

Large and heavy items such as 400kV, 220 kV, 132 kV and 33 KV equipment and structural steel , Cable drums shall be packed and shipped as per standard international practice.

Container/Cartoons, boxes, trunks and other packages shall be strong and sturdy in construction to withstand Ocean shipping, loading and unloading, transport on rough roads, and storage in tropical area and hauling and handling during erection etc. Boxes and packages shall also be protected by suitable packing with the help of wooden planks/MS frame or galvanized steel strips.
A layer of waterproof material shall be provided inside the cartoon/boxes/packages to protect the equipment from water seepage and to avoid rust.
The following information shall be marked on the container/boxes/packages etc.

a. Contractor's/manufacturer's name, project title and contract reference.

b. Plant/accessory identification No. and title.

c. Net/gross weight.

d. Employer's name with other dispatch particulars such as destination.

The employer shall take no responsibility for any damage done to the plant on route to the site of work or place of delivery whichever is applicable.

8. Tests

i) Unless otherwise specified in respective section, all equipment shall be subjected routine, acceptance and type test as covered and specified in any standard in presence of the authorized representative of the employer.

ii) Bidder shall submit type test report from a recognized laboratory along with the bid.

iii) At least 15 days advance notice shall be given by the contractor to the employer for witness the tests.

9. Compliance to IE rule 1956

i) The construction agency shall possess a safety manual duly approved by competent authority in the Govt. of his State Governing the safety in work by the personnel and staff.

ii) The agency shall possess valid contractor's license issued by the Electrical Licensing Board of Odisha (ELBO) failing which he will not be allowed to start the work.

iii) Supervisors of works shall possess appropriate valid supervisory certificate of competency issued ELBO, Odisha.

iv) At least 50% of electrical workmen employed in the project shall possess valid workmen permit by ELBO.

10. The Contractor has to follow submission of drawings, data, and document as per the format given below.

SL No.	Description	With Bids	Post Order		Final Document		
			For Review	For Records	Transparency	Prints (Photostat)	Electronic
	FOR SUB-STATION						
1.	Switchyard single line diagram						
2.	Switchyard layout, plan, section & placement of various equipment						
3.	Switchyard earthing and lightning protection calculations.						
4.	Battery, battery charger, DCDB Sizing calculations.						
5.	Switchyard lighting calculations						
6.	Switchyard earthling and lightning layout.						
7.	Switchyard lighting layout.						
8.	Switchyard ,control room equipment and cable layout.						
9.	Switchyard clamps and connector details.						
10.	Relay, metering and control panel block logic diagram.						
11.	Control panel schematic drawings.						

SL No.	Description	With Bids	Post Order		Final Document		
			For Review	For Records	Transparency	Prints (Photostat)	Electronic
12.	Logic for castle key interlock between Breaker and isolator.						
13.	Relay, metering & Control panel and ACDB,DCDB GA drawings.						
14.	Switchyard equipment GA drawings and control schematics.						
15.	Cable schedule.						
16.	Interconnection diagrams.						
17.	Relay setting calculations and Coordination drawings.						
18.	SLDs of ACDB and DCDB.						
19.	Soak pit and waste oil pit layout and sizing calculation.						
20.	Structural design calculations super structures.						
21.	Civil drawings for foundation and cable trenches.						
22.	Structural fabrication drawings of equipments gantries etc.						
23.	Filled in equipment data sheets as per enclosed format.						
24.	Complete literature, leaflets for all equipments.						
25.	Operational/maintenance manual.						
26.	Deviation schedule w.r.t. a) Specification b) Document/ attachments.						
27.	List of spare parts foreach major equipment.						
28.	List of special tools and tackles.						
29.	List of sub-vendors.						
30.	QA plan of vendor						
31.	Installation operating and maintenance instruction.						
32.	Inspection Plan and Testing Procedure.						
33.	Test Records.						
34.	List of commissioning/maintenance spares.						
35.	Data Book/Manual a)Installation Manual b) Operating/Maintenance. c)Catalogues/ Brochures.						
	FOR TRANSMISSION LINE						
36	Route map, Line Survey report(preliminary & Final) as per the BPS.						
37	Soil Investigation report of the locations						
38	Civil drawings for foundation of Tower & Foundation design						
39	Structural design calculations super structure for Tower and detail drawings.						

SL No.	Description	With Bids	Post Order		Final Document		
			For Review	For Records	Transparency	Prints (Photostat)	Electronic
40	Structural fabrication drawings of different type of towers.						
41	Tower clamps & connector, insulator and other hardware materials details.						
42	Deviation schedule w.r.t. a) Specification b) Document/ attachments.						
43	List of special tools and tackles.						
44	List of sub-vendors.						
45	QA plan of vendor						
46	Installation operating and maintenance instruction.						
47	Inspection Plan and Testing Procedure.						
48	Test Records.						
49	List of commissioning/maintenance spares.						
50	Data Book/Manual a)Installation Manual b) Operating/Maintenance. c) Catalogues/ Brochures.						

11. Minimum clearance for substation design shall be as per details given in the table below.

Highest system voltage (kV)	Insulation level (kVP)	Switching Impulse Voltage (KVP)	Sectional Clearance (mm)	Minimum clearance		Ground Clearance (mm)
				Between phase & Ground	Between phases	
36KV	170	-	3000	320	320	3700
145KV	650	-	4000	1300	1300	4600
245KV	1050	-	5000	2160	2160	5500
420KV	1425		7000	3400	3900	8000

TABLE 1 MINIMUM ELECTRICAL CLEARANCE FOR OUTDOOR SWITCHGEAR

(*Clause* 2.1.9)

Voltage Rating (Highest System Voltage)	Impulse Withstand Level*	Minimum Clearance to Earth†	Minimum Clearance Between Phases	Minimum Clearance from any Point Where the Man may be Required to Stand to the Nearest Unscreened Conductor in Air (Sectional Clearance)
(1)	(2)	(3)	(4)	(5)
kV (rms)	kV (peak)	mm	mm	mm
12	60 (List I)	90	90	2 600
	75 (List II)	120	120	2 600
36	145 (List I)	—	270	2 750
	170 (List II)	320	320	3 000
72·5	325	630	630	3 500
123	450	900	900	3 500
	550	1 100	1 100	4 000
145	450	900	900	3 500
	550	1 100	1 100	4 000
	650	1 300	1 300	4 000
245	650	1 300	1 300	4 000
	750	1 500	1 500	—
	850	1 600	1 700	4 500
	950	1 900	1 900	4 500
	1 050	2 400	2 100	5 000

*The impulse withstand levels are as given in IS : 2165-1977 Insulation coordination (*second revision*). For guidance regarding choice between List I and List II (as in col 2) for rated voltages 12 kV and 36 kV and between levels against higher rated voltages, *see* IS : 2165-1977.

†The values of minimum clearance to earth are based on Table 6A of IS : 3716-1978 Application guide for insulation coordination.

12. OPTCL adopted standard switch yard structure:

The bidders may adopt their own type tested design for switchyard structures with approval from OPTCL. However the standard switch yard structures adopted in OPTCL switch yards system in different voltage levels are given below. The height & weight are indicative only.

A	**400 KV SIDE:**
1	COLUMN: 4TA,4TB,4TC,4TD TYPE,- HEIGHT-29 (Additional Peak 5 Mtrs) MTRS, WEIGHT-10 MT
2	BEAM:4GA,4GB TYPE,-LENGTH- 27 MTRS, WEIGHT-4 MT
B	**220 KV SIDE:**
1.	COLUMN: P1S TYPE,- HEIGHT-21.5 MTRS,WEIGHT-4.464MT
2.	BEAM:Q1 TYPE,-LENGTH-18 MTRS, WEIGHT-1.473MT
C	**132 KV SIDE:**
1.	COLUMN: T1S TYPE,- HEIGHT-15 MTRS,-WEIGHT-1.193 MT
2.	COLUMN: T4S TYPE,-HEIGHT-11 MTRS,-WEIGHT-0.924 MT
3.	BEAM:G1 TYPE,-LENGTH-10.4 MTRS,-WEIGHT-0.613 MT
4.	BEAM:G2 TYPE,-LENGTH-14.9875 MTRS,-WEIGHT-0.906 MT
5.	BEAM:G1X TYPE,-LENGTH-10.4 MTRS,-WEIGHT-1.370 MT
6.	BEAM:G1,2 TYPE,-LENGTH-10.4 MTRS,-WEIGHT-1.25 MT
D	**33 KV SIDE:**
1.	COLUMN: T8S TYPE,- HEIGHT-10.5 MTRS,WEIGHT- 0.777 MT
2.	COLUMN: T9S TYPE,-HEIGHT-7.5 MTRS,WEIGHT - 0.592 MT
3.	BEAM:G4 TYPE,-LENGTH-5.5 MTRS,WEIGHT-0.306 MT
4.	BEAM:G4X TYPE,-LENGTH-5.5 MTRS,WEIGHT-0.306 MT
5.	BEAM:G6 TYPE,-LENGTH- MTRS,WEIGHT-7.25 MT
E	**THE BAY WIDTH OF DIFFERENT VOLTAGE LEVEL ARE AS BELOW**
1.	400 KV SYSTEM SHALL BE 27 MTRS.
2.	220 KV SYSTEM SHALL BE 18 MTRS
3.	132 KV SYSTEM SHALL BE 10.4/13.1MTRS.
4.	33 KV SYSTEM SHALL BE 5.5 MTRS

13. OPTCL adopted standard Tower structure for transmission line:

The contractor may adopt their own type tested design for transmission line structures/towers with approval from OPTCL. However the standard tower structures adopted in OPTCL for different voltage levels are given below. The height & weight are indicative only.

A. **132 KV Transmission line.(Height 29 Mtrs) (MS Galvanised)**

(i) "PA" type: Unit weight: 3.430 MT.

(ii) + 3 mtrs: Unit weight: 0.537 MT.

(iii) + 6 mtrs: Unit weight: 1.349MT.

(iv) "PB" type: Unit weight: 4.973 MT.

(v) + 3 mtrs: Unit weight: 1.018 MT.

(vi) + 6 mtrs: Unit weight: 2.104 MT.

(vii) "PC" type: Unit weight: 6.214 MT.

(viii) + 3 mtrs: Unit weight: 1.119 MT.

(ix) + 6 mtrs: Unit weight: 2.342 MT.

(x) Templates for PA- Unit weight: 0.665 MT

(xi) Templates for PB- Unit weight: 0.602 MT

(xii) Templates for PC- Unit weight: 1.904 MT

B. **220 KV Transmission line.(Height 35.5 Mtrs) (MS Galvanised)**

(i) "OA" type: Unit weight: 4.351 MT.

(ii) + 3 mtrs: Unit weight: 0.727 MT.

(iii) + 6 mtrs: Unit weight: 1.448 MT.

(iv) "OB" type: Unit weight: 7.574 MT.

(v) + 3 mtrs: Unit weight: 1.305 MT.

(vi) + 6 mtrs: Unit weight: 2.242 MT.

(vii) "OC" type: Unit weight: 9.839 MT.

(viii) + 3 mtrs: Unit weight: 1.436 MT.

(ix) + 6 mtrs: Unit weight: 2.599 MT.

(x) +15 mtrs: Unit weight: 6.670 MT

(xi) "UR" : Unit weight: 13.585 MT.

(xii) + 3 mtrs type: Unit weight: 2.598 MT.

(xiii) + 6 mtrs type: Unit weight: 4.249 MT.

(xiv) Templates for OA- Unit weight: 0.597 MT

(xv) Templates for OB- Unit weight: 0.815 MT

(xvi) Templates for OC- Unit weight: 1.172 MT

(xvii) Templates for UR- Unit weight: 1.509 MT

C. 400 KV Transmission line Tower.(Height 46 Mtrs) **(HT Steel in Leg Section,Cross Arm & Main Bracing and other Section MS)**

(I) DA (Normal) Type:(0 to 2 deg): 7.54869 MT

DA(+3 Mtr extn): +1.93856 MT

DA(+6 Mtr Extn): +2.74532 MT

DA(+9 Mtr Extn): +4.62562 MT

(ii) DB Type:(2 to 15 deg): 13.96342 MT

DB(+3 Mtr extn): + 2.44864 MT

DB(+6 Mtr Extn): +4.82572 MT

DB(+9 Mtr Extn): +9.34636 MT

(iii) DC Type:(15 to 30 deg): 15.78074 MT

DC(+3 Mtr extn): +2.90732 MT

DC(+6 Mtr Extn): +5.4436 MT

DC (+9 Mtr Extn): +9.94816 MT

(iv) DD Type:(30 to 60 deg): 22.29494 MT.

DD(+3 Mtr extn): +4.11758 MT

DD(+6 Mtr Extn): +5.25294 MT

DD (+9 Mtr Extn): +7.2021 MT

D. No. of Bolts & Nuts used in each of the Tower

Type of Tower	Normal	+3 mtrs	+6 mtrs	+9 mtrs
PA	1602	142	276	
PB	1097	273	542	
PC	1654	313	592	
OA	1147	180	228	
OB	1299	236	372	
OC	1877	254	402	
UR	2283	357	588	
DA	1980	524	722	1214
DB	3668	656	1284	2464
DC	4140	786	1442	2608
DD	5844	1080	1388	1912

14. Approved Make of Equipment & Materials to be used in the Sub-station and Transmission lines.

The following make of the equipment **&** materials shall be supplied as per valid approved vendor list.

Approved Vendor list of OPTCL as on 31.03.2021 for supplying materials to the contractors, awarded with total turnkey / partial turnkey projects of OPTCL Valid up to Dt.30.09.2021.		
Breaker		
Breaker (up to 400 KV Spring-Spring,SF-6)		M/s ABB India Ltd, Bengaluru
		M/s CG Power and Industrial Solutions Ltd, Kolkata
		M/s GE T&D India Limited, Bhubaneswar
		M/s. Siemens Limited, Kolkata
VCB		
33 KV Spring-Vacuum, 1600A, 25 kA		M/s Shreem Electric Ltd., Maharastra,
		M/s. Stelmec Limited, Mumbai
		M/s Yamuna Power & Infrastructure Limited, Jagadhri
CT		
CT of 0.2S Accuracy class up to 400 KV	1	M/s CG Power and Industrial Solutions Ltd, (Kolkata
		M/s GE T&D India Limited, Bhubaneswar
CT of 0.2S Accuracy class up to 220 KV	1	M/s SCT (P) Ltd, (Formerly SCT Ltd), Ghaziabad
		M/s.Heptacare Power Industries Pvt. ltd, Meerut
		M/s Vidyuth Control Systems Pvt. Ltd, Secunderabad
		M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. Telengana
		M/s Hivoltrans Electricals Pvt Ltt, Gujarat
		M/s Mehru Electrical & Mechanical Engineers (P) Ltd, Bhiwadi
CT of 0.2S Accuracy class up to 132 KV		M/s Pragati Electricals Pvt Ltd, Navi Mumbai
		M/s Kapco Electric Pvt. Ltd, Noida
		M/s.Vishal Transformers & Switchgears Pvt. Limited, Meerut
		M/s. Siemens Limited, Kolkata
		M/s ABB India Ltd, 21st Floor, World Trade Centre, Bengaluru
CT of 0.2S Accuracy class up to 33 KV		M/s. Straton Electricals Pvt. Limited, Hyderabad
PT (IVT)		
PT/ IVT of 0.2S Accuracy class up to 400 KV		M/s CG Power and Industrial Solutions Ltd, Kolkata
PT/ IVT of 0.2S Accuracy class up to 220 KV		M/s SCT (P) Ltd, (Formerly SCT Ltd), Ghaziabad
		M/s.Heptacare Power Industries Pvt. ltd, Meerut
		M/s Mehru Electrical & Mechanical Engineers (P) Ltd, Bhiwadi
		M/s Vidyuth Control Systems Pvt. Ltd, Secunderabad

		M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. Telengana
		M/s Hivoltrans Electricals Pvt Ltt, Gujarat
PT/ IVT of 0.2S Accuracy class up to 132 KV		M/s Pragati Electricals Pvt Ltd, Navi Mumbai
PT of 0.2 Accuracy class up to 33 KV		M/s. Straton Electricals Pvt. Limited, Hyderabad
		M/s.Vishal Transformers & Switchgears Pvt. Limited, Meerut
Surge Arrestor/ LA		
Surge Arrestor up to 400 KV		M/s CG Power and Industrial Solutions Ltd, Kolkata
		M/s Lamco Industries Pvt Ltd, Hyderabad
		M/s Oblum Electrical Industries Hyderabad
Surge Arrestor up to 220 KV		M/s Electrolites (Power) Pvt. Ltd, Jaipur
		M/s Shreem Electric Ltd., Jaysingpur
CVT		
CVT of 0.2 accuracy class up to 400 KV		M/s ABB India Ltd, Bengaluru
		M/s CG Power and Industrial Solutions Ltd, Kolkata
		M/s GE T&D India Limited, Bhubaneswar
		M/s. Siemens Limited, Kolkata
CVT of 0.2 accuracy class up to 132 KV		M/s Mehru Electrical & Mechanical Engineers (P) Ltd, Bhiwadi
Hardware fitting		
Hardware fitting up to 400KV	1	M/s Supreme & Company Pvt. Ltd., Kolkata
		M/s Electromech & Transtech Pvt. Ltd., Kolkata
		M/s KSE Electricals Pvt. Ltd, Kolkata
		M/s Krsna Transmission Hardware Mfg. Pvt. Ltd, Vadodara
		M/s IAC Electricals Pvt. Ltd, Kolkata
		M/s Transmission Line Products, Kolkata
		M/s Swamiji Transmission Pvt Ltd, Kolkata
		M/s Legion Energy, Bangaluru
		M/s Industrial Spare Products, Kolkata
		M/s Mosdorfer India Pvt. Ltd, Mumbai
Hardware fitting up to 220KV		M/s. Jainco Transmission Limited,
		M/s Aumni Transmission Industry Pvt. Ltd, Vadodra,
		M/s Nike Energy Manufacturing Pvt Ltd, Varanasi
Hardware Fittings & Accessories up to 132 kV		M/s S.R.Electricals Pvt ltd, Howrah
Clamp & Connectors		
Clamp and Connector up to 400 KV	1	M/s Supreme & Company Pvt. Ltd., Kolkata
	2	M/s Electromech & Transtech Pvt. Ltd., Kolkata
		M/s KSE Electricals Pvt. Ltd, Kolkata

		M/s Swamiji Transmission Pvt Ltd, Kolkata
		M/s Legion Energy, Bangaluru
		M/s Industrial Spare Products,
		M/s Exalt Enginering Industries, Mumbai
		M/s Premier Power Products (Cal) Pvt. Ltd, Kolkata
Clamp and Connector up to 220 KV		M/s Krsna Transmission Hardware Mfg. Pvt. Ltd, Vadodara
		M/s. Jainco Transmission Limited, Kolkata
		M/s Aumni Transmission Industry Pvt. Ltd, Vadodra,
Conductor		
Conductor (ACSR & AAAC)	1	M/s Anvil Cable Pvt. Ltd, Kolkata
	2	M/s Lumino Industries Ltd, Kolkata
	3	M/s Mahavir Transmission Limited, Noida
		M/s Dynamic Cables Private Ltd, Jaipur
Conductor (ACSR & AAAC)		M/s Gupta Power Infrastructure Limited, Bhubaneswar
		M/s Sterlite Power Transmission ltd, New Delhi
		M/s Shashi Cables ltd, Lucknow
		M/s Cabcon India Limited, Kolkata
		M/s Polycab Wires Pvt. Ltd, Mumbai
		M/s Hindusthan Urban Infrastructure Ltd, New Delhi
		M/s Galaxy Transmissions Privale Limited, Sangli
		M/s JSK Industries Pvt. Ltd, Silvassa
		M/s Tirupati Conductors Pvt Ltd, Bhubaneswar
ACSR (Moose, Zebra and Panther		M/s PRATEEK WIRES PVT LTD, Kolkata
GI Earthwire		
GI Earthwire (7/3.15 mm & 7/3.66 mm)		M/s Nirmal Wires Pvt. Ltd, Kolkata
		M/s Cabcon India Limited, Kolkata
		M/s Geekay Wires Ltd, Hyderabad
OPGW Cable with Hardware Accessories		
OPGW Cable Hardware Accessories		M/s Krsna Transmission Hardware Mfg. Pvt. Ltd, Vadodara
		M/s Aumni Transmission Industry Pvt. Ltd, Vadodra,
OPGW Cable with Hardware Accessories		M/s Sterlite Power Transmission ltd, New Delhi
		M/s TG ADVAIT INDIA PVT LTD, Ahmedabad
		M/s ZTT india Private Limited, A.P
INSULATORS		
Porcelain Long rod Insulators & Solid core Post Insulators	1	M/s Modern Insulators Limited, Rajstan
Porcelain solid core post Insulator/ Porcelain Bus Post Insulator) up to 400 KV		M/s SARAVANA GLOBAL ENERGY LIMITED. Chennai

Solid core Post Insulators		M/s CJI Porcelain Pvt. Ltd, New Delhi
Composite Polymer Insulator & Composite Polymer Bus Post Insulator up to 400 KV	2	M/s Deccan Enterprises Ltd, Hyderabad
Composite Polymer Insulator & Silicon Rubber Composite Polymer Insulator (up to 220KV-160KN)		M/s Spark Insulators Pvt. Ltd., Hyderabad
DISC INSULATOR (160KN, 120KN, 90KN), ANTIFOG & NORMAL TYPE	3	M/s Imperial Ceramics Pvt. Ltd., Bikaner
	4	M/s Bikaner Ceramics Private Limited, Bikaner
	5	M/s Allied Ceramics Pvt. Ltd, Kolkata
	6	M/s Grasim Industries Limited, , West Bengal
DISC INSULATOR (120KN, 90KN), ANTIFOG & NORMAL TYPE		M/s Hindustan Chemicals, Khurja
Porcelain Disc Insulator/ Porcelain Bus Post Insulator		M/s Insulators& Electricals Company, New delhi
Composite polymer Insulator (up to 400 KV-160 KN)"		M/s Shree Radhe Industries, Vadodara
		M/s TRP Sealing Systems (India) Pvt. Ltd. Medchal
Composite Polymer Insulator (up to 220KV-120KN)"		M/s Yamuna Power & Infrastructure Limited, Jagadhri
ISOLATORS		
ISOLATOR up to 400KV		M/s.Switchgears & Structurals (India) Pvt. Ltd, Hyderabad
		M/s Electrolites (Power) Pvt. Ltd, Jaipur
		M/s. Siemens Limited, Kolkata
		M/s ABB India Ltd, 21st Floor, World Trade Centre, Bengaluru
		M/s GR Power Switchgear Ltd, Hyderabad
ISOLATOR up to 220KV		M/s.Switchgears Manufacturing Company Pvt Ltd, Hyderabad
		M/s JDE Switchgear Private Limited,
ISOLATOR up to 132KV		M/s Faraday Electricals Pvt. Ltd, Jaipur
Battery Charger		
220 V Battery Charger for VRLA & Plante Type		M/s Amara Raja Power Systems Ltd, Tirupati
		M/s Statcon Energiaa Pvt Ltd, Noida
		M/s Voltech Manufacturing Company Ltd, Chennai
		M/s. Chloride Power Systems and Solutions Ltd., Kolkata

EHV Grade XLPE Cable (both Al & Cu)		
EHV Grade XLPE Cable (both Al & Cu) up to 220KV	1	M/s KEI Industries Limited, Kolkata
	2	M/s UNIVERSAL CABLES LIMITED, Kolkata
		M/s KEC International Limited, Mumbai
		M/s Cable Corporation of India Ltd, Mumbai
EHV Grade XLPE Cable (both Al & Cu) up to 132KV		M/s LS Cable India Pvt Ltd,
		M/s Finolex J-Power Systems Pvt. Ltd, Pune
EHV Grade XLPE Cable (Both Al & Cu) up to 33 KV		M/s Dynamic Cables Private Ltd, Jaipur
		M/s Polycab Wires Pvt. Ltd, Mumbai
		M/s Crystal Cable Industries Ltd, Kolkata
		M/s Havells India Ltd, Bhubaneswar
		M/s Gemcab Industries ltd, New delhi
Cable End termination Kit for 220kV/132kV/33kV		
Cable End termination Kit up to 220 kV		M/s 3M Electro & communication india Pvt ltd, Kolkata
		M/s Raychem RPG (P) Ltd. Kolkata
Cable end termination Kit up to 33 KV		M/s Yamuna Cable Accessories Pvt. Limited, Yamuna Nagar
Fire Fighting Equipment (Portable type & Trolley mounted Mobile type)		
Fire Fighting Equipment (Portable type & Trolley mounted Mobile type)		M/s Laxmi Fabricators, Mumbai
		M/s Kanadia Fyr Fyter Pvt. Ltd, Sihor
Station Transformer		
Station Transformer (33/0.433 KV) up to 500 KVA		M/s Orissa Transformers Pvt. Ltd., Bhubaneswar
Station Transformer (33/0.433 KV) up to 250 KVA		M/s Esennar Transformers (P) Ltd, Telengana
		M/s Guru Teg Bahadur Metal Works, Punjab
Station Transformer (33/0.433 KV) up to 1000 KVA		M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. Telengana
		M/s Voltech Manufacturing Company Ltd, Chennai
Lighting Fixture		
Lighting Fixture		M/s. PYROTECH ELECTRONICS PRIVATE LIMITED, Rajasthan
		M/s WIPRO ENTRPRISES PRIVATE LIMITED, Bhubaneswar,
		M/s Surya Roshni Ltd, Bhubaneswar
		M/s Asco Switchgears Pvt Ltd, Punjab
		M/s Halonix Technologies Pvt. Ltd, Uttarakhand
		M/s. Jaquar & Company Pvt. Ltd, Haryana
		M/s Dhanashree Electronics Limited, Kolkata,

		M/s HPL Electric & power Ltd,Bhubaneswar,
CONTROL, PROTECTION & SAS SYSTEM		
Conventional Control & Relay Panel, , Event Logger, Disturbance Recorder (up to 400 KV)		M/s GE T&D India Limited, Bhubaneswar
		M/s. Siemens Limited, Kolkata
		M/s ABB India Ltd, Bengaluru
		M/s ZIV Automation India Ltd, Bangalore
Conventional Control & Relay Panel, , Event Logger, Disturbance Recorder (up to 220 KV)		M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Medak,
Conventional Control & Relay Panel, , Event Logger, Disturbance Recorder (up to 220 KV)		M/s Amara Raja Power Systems Ltd, Tirupati
		M/s Scope T&M Pvt. Ltd, Mumbai
Conventional Control & Relay Panel, Event Logger, Disturbance Recorder (up to 33 KV)		M/s. Avana Electrosystems Pvt Ltd, Bangalore
		M/s. Stelmec Limited, Mumbai
		M/s CG Power and Industrial Solutions Ltd, Kolkata
Conventional Control & Relay Panel up to 22kV		M/s Schneider Electric Infrastructure Ltd, Bhubaneswar
NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS		
NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS up to 400 KV		M/s GE T&D India Limited, Bhubaneswar
		M/s. Siemens Limited, Kolkata
		M/s ABB India Ltd, Bengaluru
		M/s ZIV Automation India Ltd, Bangalore
NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS up to 220 KV		M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Medak,
AUXLIARY RELAYS, IEC-61850 up to 132 kV		M/s JVS Electronics Pvt ltd, Karnataka
NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS up to 33 KV		M/s CG Power and Industrial Solutions Ltd, Kolkata
SUB-STATION AUTOMATION PANELS		
SUB-STATION AUTOMATION PANELS up to 400 kV		M/s GE T&D India Limited, Bhubaneswar
		M/s. Siemens Limited, Kolkata
		M/s ABB India Ltd, Bengaluru
		M/s ZIV Automation India Ltd, Bangalore
SUB-STATION AUTOMATION PANELS up to 220 kV		M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Telengana
132/33kV S/S (132 kV & 33 kV) BCU based CR panel with SAS		M/s Schneider Electric Infrastructure Ltd, Bhubaneswar
GIS Equipment for indoor sub station		
		M/s. Siemens Limited, Kolkata

GIS Equipments for Indoor GIS Sub Station up to 400 KV		M/s ABB India Ltd, 21st Floor, Bengaluru
GIS Equipments for indoor sub station up to 220 KV		M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Medak,
GIS Equipments for indoor sub station up to 33 KV		M/s CG Power and Industrial Solutions Ltd, Kolkata
In-door SIS of GIS S/S up to 33 KV		M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Telengana
		M**/s Schneider Electric infrastructure Ltd**, Bhubaneswar
GI Nuts & Bolts		
GI Nuts & Bolts	1	M/s Supreme & Company Pvt. Ltd., Kolkata
	2	M/s Shivam Auto Forge, LUDHIANA
		M/s ASP Pvt. Ltd, Howrah
		M/s PIONEER NUTS & BOLTS PVT LTD, LUDHIANA
		M/s. Perfect Industries Ltd, Ludhiana
		M/s Garg Fasteners, Ludhiana
		M/s Shree Ambey Metal Industries Ltd, Ludhiana
		M/s Sterling Bolts pvt ltd, Kolkata
		M/s Remax (India), Ludhiana
		M/s A.V.Forgings, Punjab
		M/s Remax Fastners Industries, Punjab
STEEL		
STEEL (Including TMT Bars)"	1	M/s. Reliable Sponge Pvt. Ltd., Rourkela
	2	M/s Shyam Metalics and Energy Limited, Kolkata
		M/s New Laxmi Steel & Power Pvt. Ltd, Bhubaneswar-
		M/s MSP Steels & Power Ltd, Kolkata-
		M/s Vandana Ispat ltd, " Raipur
		M/s Khyati Ispat pvt. Ltd, Raipur-
		M/s Shri Bajrang Alloys ltd, , Raipur
		M/s.SKS Ispat and Power Ltd, Raipur,
		M/s. Mahamaya Steel Industries Ltd, Raipur
		M/s Prime Ispat Ltd, Raipur
		M/s Jindal Steel & power Limited, Bhubaneswar
		M/s. Shree Nakoda Ispat Limited, Raipur
		M/s Goyal Energy & Steel Pvt ltd, Chhatisgarh
		M/s Sarthak Ispat Pvt Ltd, Raipur
TOWER STRUCTURE & SUB-STATION EQUIPMENT STRUCTURE		
		M/s. Shri Ashutosh Engineering Industries.
		M/s Vijay Transmission Pvt. Ltd,
		M/s R.R.Ispat (A Unit of Godawari Power & Ispat Ltd)
		M/s New Modern Techno-mech Pvt. Ltd.
		M/s Reliable sponge Pvt Ltd.
Galvanized Earthing Pipe		

Galvanized Earthing Pipe		M/s J.D. FABRICATION, Balasore
Galvanized Earthing Flat & Foundation Bolts		
Galvanized Earthing Flat & Foundation Bolts		M/s J.D. FABRICATION, Balasore
ACDB /DCDB / BMK / CONSOLE BOX		
ACDB /DCDB / BMK / CONSOLE BOX		M/s UNITED ENGINEERS PVT LTD, BHUBANESWAR
		M/s Amara Raja Power Systems Ltd, Tirupati
		M/s. Bose Engineering (India) Pvt. Ltd, Kolkata
		M/s S R Automation Pvt. Ltd, Kolkata-700103
		M/s AIM Engineering Industries, Kolkata
		M/s Control Devices, Kolkata-
		M/s Electro Allied Products, Kolkata
		M/s. S.K .Engineers India Pvt. Limited, Bhubaneswar
		M/s Technocrat Enterprises, Cuttack
		M/s. Ultima Switchgears Limited, New delhi
		M/s Nitya Electrocontrols Pvt Ltd, Noida
		M/s Baid Power Services Pvt. Ltd, Kolkata
LT XLPE Cable of 1100 V		
LT XLPE Cable of 1100 V		M/s Dynamic Cables Private Ltd, Jaipur
		M/s Vishal Cables Pvt. Ltd, Mumbai-
		M/s Zenium Cables Ltd, Mumbai-
		M/s Paramount Communications Ltd, New Delhi
		M/s Havells India Ltd, Bhubaneswar
		M/s Prime Cable Industries Pvt Ltd, Delhi
		M/s Ravin cable Ltd, 302, Mumbai
		M/s Alpha Communication Ltd, Delhi
		M/s Gupta Power Infrastructure Limited, Bhubaneswar
		M/s CMI Energy India Pvt. Ltd, New Delhi
PVC INSULATED POWER & CONTROL CABLES (with Type-C Insulation)		
PVC INSULATED POWER & CONTROL CABLES (with Type-C Insulation)		M/s Grid India Power Cables Pvt. Ltd, Haryana
		M/s Dynamic Cables Private Ltd, Jaipur-302013,
		M/s Prime Cable Industries Delhi
		M/s Genus Electrotech Ltd, Gujarat
		M/s KEI Industries Ltd, Kolkata
		M/s Universal cables Ltd, Kolkata
		M/s Paramount Communications Ltd, New Delhi
		M/s Zenium Cables Ltd, Mumbai
		M/s Vishal Cables Pvt. Ltd, Mumbai
		M/s Polycab Wires Pvt. Ltd, Mumbai-
		M/s CMI Energy India Pvt. Ltd, New Delhi
		M/s Cabcon India Limited, Kolkata
		M/s Crystal Cable Industries Ltd, Kolkata
		M/s Volts Energy Incorporation, Himachal Pradesh,
		M/s. Gloster Cables Ltd, Secunderabad
		M/s. Ashoka Industries, Jajpur

		M/s Ravin cable Ltd, 302, Mumbai
		M/s Alpha Communication Ltd, Delhi
		M/s Gupta Power Infrastructure Limited, Bhubaneswar
		M/s Gemcab Industries ltd, New delhi
TELECOMMUNICATION ITEMS		
48 V Battery Charger		
48 V DC Battery Charger for VRLA		M/s Amara Raja Power Systems Ltd, Tirupati
		M/s. Chloride Power Systems and Solutions Ltd., Kolkata
Digital PLCC, Protection Coupler, FSK Modem for VFT		
Digital PLCC, Protection Coupler, FSK Modem for VFT up to 400 KV		**M/s GE T&D India Limited,** Bhubaneswar, Mail:
		M/s ZIV Automation India Ltd, Bangalore
		M/s. Siemens Limited, Kolkata
		M/s ABB India Ltd, Bengaluru
MUX, OLTE, DACs & OPTICAL POWER AMPLIFIER		
MUX,OPTICAL LINE TERMINAL EQUIPMENT (OLTE),DIGITAL ACCESS CROSS CONNECT (DACs) & OPTCAL POWER AMPLIFIER COMPATIBLE TO OPTCL SCADA SYSTEM	1	**M/s Commtel Networks Pvt Ltd** , Nabvi Mumbai
		M/s ABB India Ltd, Bengaluru
RTU Conforming to IEC Protocols in Use		
RTU Conforming to IEC Protocols in Use		**M/s Chemtrols Industries Pvt. Ltd**, Mumbai
		M/s GE T&D India Limited, Bhubaneswar
		M/s ABB India Ltd, Bengaluru
		M/s ZIV Automation India Ltd, Bangalore
		M/s. Siemens Limited, Kolkata
Wave Trap		
Wave trap up to 220 KV		**M/s Quality Power Electrical Equipment Pvt Ltd**, Maharastra,
Line Matching Unit		
Line Matching unit up to 400 kV		**M/s. Siemens Limited**, Kolkata
		M/s ZIV Automation India Ltd, Bangalore
		M/s ABB India Ltd, Bengaluru
75Ω/125Ω HF COAXIAL CABLES		
75Ω/125Ω HF COAXIAL CABLES		M/s Alpha Communication Ltd, Delhi

NOTE: Prior approval from OPTCL is required before finalization of above vendors.

15. Portable Fire Extinguisher: (NA)

Portable fire extinguishers of the following types shall be supplied to each sub-station.

Sl No	Description of Items	Unit	capacity	Quantity Required		
				At each 132/33 kV S/S	At each 220/132/33 kV S/S	At each 220/33 kV S/S
1	Foam Type	Nos	9 ltrs	2	4	4
2	Dry chemical Powder Type (Trolley mounted)	Nos	22.5 Kgs	2	4	2
3	Dry Powder Type	Nos	5 Kgs	2	4	2
4	Carbon Dioxide (CO_2)	Nos	4.5Kgs	5	10	5
5	Carbon dioxide (CO_2)Trolley mounted	Nos	22.5 Kgs	2	4	2
6	Fire bucket with (a set comprises of six nos Bucket in each stand & one stand)	Set		3	5	3
7	9 litre water type	Nos	9 litre	4	4	4
8	50 Litres Mechanical Foam type	Nos	50 Litres	2	2	2

The quantities are indicative. Bidders are advised to design as per the requirement.

16. Maintenance & Testing Equipment: (NA) (ANNEXURE-I)

Maintenance & testing equipment shall be supplied & installed for each substation as per the list given below.

Description of Items	**Units**	**ALL 132/33 KV**	**ALL 220/132/ 33 KV S/S**	**220/33 KV S/S**	**MAKE**
100 kv automatic transformer oil breakdown voltage test set	Nos	1	1	1	Baur/Megger
5 KV Insulation resistance tester	Nos	1	1	1	Omicron/ Doble/ Megger
Contact Resistance Measurement Kit- (Milli volt drop measurement (Contact resistance measurement - 200Amp DC)	Set	1	1	1	Omicron/ Doble /Megger
Oil sampling bottle	Nos	4	4	4	
SF6 gas leak detector	Nos	1	1	1	Flir/Fluke
LCD, digital multimeter	Nos	2	2	2	Fluke/ Megger
LCD, clamp on meter	Nos	2	2	2	Fluke/ Megger
4 Point Digital earth tester	Nos	1	1	1	Fluke/ Megger
Fibre glass Discharge rod as per standard for carrying out the switch yard maintenance work. (6 nos. for T/L and 6 nos. for SS)	Nos	12	12	12	
Rubber gloves of operation of isolators and earth switch	Pairs	2	2	2	
Universal Relay Test kit	Sets	1	1	1	Omicron/ Megger
Portable high beam emergency light	Nos	4	4	4	
Latest version desktop PC of reputed make with all its accessories including CPU, Monitor, UPS and having all latest loaded software and also its back up in shape of CD and separate pen drive . suitable for loading of software as recommended by the relay manufacturer. It includes supply of one no portable laser printer of reputed make.	Set	1	1	1	Make of PC and printer: HP/DELL/ Lenovo

Note: Prior approvals of OPTCL for all the testing equipment are to be taken.

17. Other Tools and Plants (T&P's) Requirement: (ANNEXURE-II) (NA)

Following T&P's of reputed make shall be supplied & installed at each substation.

Sl No	Description of Items	unit	Quantity Required			
			At each 400/220 KV S/S	At each 220/132/33 KV S/S	At each 220/33 KV S/S	At each 132/33 KV S/S
1	Set of "D" spanner(6mm – 42mm)	Set	1	1	1	1
2	Set of "Ring" spanner(6mm – 42mm)	Set	1	1	1	1
3	Rachet/Socket wrench with sockets, handles, and other attachment(6mm-42mm) with Box	Set	2	2	1	1
4	Torque wrench with attachments(6mm-42mm)	Set	1	1	1	1
5	Insulated cutting plier	Nos	2	2	2	2
6	Insulated nose plier	Nos	2	2	2	2
7	Monkey plier	Nos	1	1	1	1
8	Circlip plier	Nos	1	1	1	1
9	Pipe wrench a)12 inch – 1 no b)18 inch – 1 no	Set	1	1	1	1
10	Sly wrench a)12inch – 2 nos b)18inch – 1 no	Set	1	1	1	1
11	Insulated handle screw drivers of different sizes as per required a)12inch plain head – 2 nos b)8inch plain head – 2 nos c) 12inch star head – 1 no d) small size6inch plain and star head – 2 each e)Complete set of different head in one box/set -1set	Set	1	1	1	1
12	"L"-N keys set of different sizes in one box/set	Set	1	1	1	1
13	M.S Files(12inch and 6inch sizes) Round files and flat files-one each of different sizes)	set	1	1	1	1
14	Hammar with handle a)1 lb – 2 nos b)1/2 lb-2 nos c)2 lb-1 no	Set	1	1	1	1
15	Crow bar a)5 ft – 2nos b)3ft-2 nos	set	1	1	1	1
16	Steel scale(12inch)	Nos	2	2	2	2
17	Steel tape a)5 mtrs-2 nos b)30mtrs-1 no	Set	1	1	1	1
18	Oil cane	Nos	2	2	2	2
19	Spirit level (8inch)	No	2	2	2	2
20	Plumb head with string and attachment	No	1	1	1	1
21	Maintenance safety belt with all attachment and helmets(complete one set)	Set	3	4	3	3

Sl No	Description of Items	unit	Quantity Required			
			At each 400/220 KV S/S	At each 220/132/33 KV S/S	At each 220/33 KV S/S	At each 132/33 KV S/S
22	Hand drill machine for concrete drilling with different bits and key.(Wolf /Bosch make)	No	1	1	1	1
23	Insect Repeller	No	2	2	2	2
24	RO heavy duty water purifier with 10 Litre capacity(Aquaguard/Kent)	No	1	1	1	1
25	Vacuum cleaner having hot blower provision with all attachments (Eureka Forbes make)	No	1	1	1	1
26	1 Litr Electric Kettle	No	1	1	1	1
27	230 volt induction heater	No	1	1	1	1
28	HV detecter	No	1	1	1	1
29	Hydrometer(Thimson)	No	5	5	5	5
30	stretcher	No	1	1	1	1
31	Safety belt	No	4	4	4	4
32	Pedestal mounted wheel fitted Manual lifting support(Derrick pole) Small- 3 leg 7 Mtrs big- 10 Mtrs (8" thick pipe-single pole)	No.	1 each	1 each	1 each	1 each
33	Sliding/Extension Aluminium Ladder i) 5 Mtrs ii) 10 Mtrs	No.	1 each	1 each	1 each	1 each
34	Foldable/step Ladder	No.	1	1	1	1
35	P.P rope – 1/2 "(12mm), 5/8"(16mm), 3/4" (18mm)	Km	2 km for each size	2 km for each size	2 km for each size	2 km for each size
36	Double sheave pulley- 5 ton capacity	No.	1	1	1	1
37	Single sheave Pulley- 1 ton capacity	No.	4	4	4	4
38	Galkata single sheave pulley- 1ton capacity	No.	1	1	1	1
39	triple sheave pulley- 5 ton capacity	No.	1	1	1	1
40	Chain Pulley- 10 ton capacity	No.	1	1	1	1
41	Trifor-10 ton	No.	1	1	1	1
42	Winch Machine-10 ton	No.	1	1	1	1
43	Tommy rod	No.	1	1	1	1
44	Crow bar	No.	1	1	1	1
45	Come along clamp for different conductor connectors(for ACSR Panther, ACSR Zebra, AAAC Zebra, ACSR Moose, AAAC Moose)	No.	10 for each type	10 for each type	10 for each type	10 for each type
46	Bull dog Clamp(1/2 ",5/8 ",3/4 ")	No.	10	10	10	10
47	D shackles(1/2 ",5/8 ",3/4 "))	No.	10	10	10	10
48	Rail pole piece-2 feet	No.	1	1	1	1
49	3 kw Portable welding Machine	No.	1	1	1	1
50	3 KW portable generator set(Honda)	No.	1	1	1	1
51	Bench vice	No.	1	1	1	1
52	Hole punching machine with 12 bits of different size	No.	1	1	1	1
53	Crimping tools Small- up to 6 SQMM	No.	1 each	1 each	1 each	1 each

Sl No	Description of Items	unit	Quantity Required			
			At each 400/220 KV S/S	At each 220/132/33 KV S/S	At each 220/33 KV S/S	At each 132/33 KV S/S
	Big: for aluminum Power cable					
54	Aska Light	No.	2	2	1	1
55	Industrial heavy duty 2.2. kw chop saw machine for conductor/steel cutting(Bosch)	No.	1	1	1	1
56	Professional hand chop saw machine cum angle grinder(Bosch)	No.	1	1	1	1
57	Portable petrol gasoline heavy duty cordless chain saw 22 inch for tree cutting(Bosch/Dewalt)	No.	2	2	1	1
58	Conductor compressor machine (for ACSR Panther,ACSR Zebra,AAAC Zebra, ACSR Moose,AAAC Moose, GS earth wire-Die set)	No.	1	1	1	1
59	Portable 1.5 HP petrol heavy duty bush cutter/grass cutter.(Honda)	No.	1	1	1	1
60	3 volt battery cell charger	No.	1	1	1	1
61	230-250VAC,80W,450mm sweep,1400 rpm stand(rugged) FAN Make: Almonard/CGL	No	4	4	2	2

** T&P's shall be of Taparia/Geodre make. The hand drill and vacuum cleaner shall be wolf/Bosch and Eureka Forbes make. All machines shall be of Bosch/Dewalt make.

Due approval shall be taken before purchase of the above material and the T&P. Procurement process shall start only after availing permission from the competent authority preferably just before two months of charging of the substation

18. Office Furniture: (NA) (ANNEXURE-III)

Office furniture shall be supplied & installed at each substation as per the list given below. All the furniture shall be of Godrej make. Before supply of the furniture to the sub-station, approval from OPTCL is required. Details of the scope of supply are as indicated below.

Sl No	Description of Items	unit	Quantity Required		
			At each 132/33 KV S/S	At each 220/132/33 KV S/S	At each 220/33 KV S/S
1	5ftX3ft executive table with drawer both sides	Nos	5	6	5
2	3ftX2&1/2ft Table with one side drawer	Nos	7	8	7
3	Computer table suitable keeping monitor, CPU, UPS and printer with two nos revolving arm chair suitable for computer use.	Set	2	2	2
4	Executive revolving ,adjustable (height) chairs with arm	Nos	5	6	5
5	Cushion fixed “S” type steel chairs with arm	Nos	18	24	18
6	6ftX3ft conference table	Nos	1	1	1
7	Cushion arm steel chairs for conference table purpose.	Nos	6	8	6
8	6ft height steel almirah (only with selves) for keeping records and other valuable items.	Nos	4	6	4
9	6ft height steel almirah with glass doors for library purpose	Nos	2	2	2
10	6ft height (having minimum 6 lockers facility) steel cupboard with locking arrangement.	Nos	2	2	2
11	4ft steel rack (minimum three selves) for keeping the files and other items.	Nos	8	10	8

END OF VOLUME-II –SECTION-I (SCOPE OF WORK)