

SCOPE OF WORK (SOW)

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1. GENERAL

Kallam Transmission Limited ("KTL") is implementing Augmentation of transformation capacity at Kallam Pooling Station ("Kallam PS") by 2x500 MVA, 400/220 kV ICTs (3rd & 4th) along with 220kV bays for RE interconnection.

1.1.Associated Transmission System:

The following transmission system is envisaged under the scheme:

- i) Augmentation of Kallam Pooling Station by 2x500 MVA
 - 500 MVA, 400/220kV ICT: 2 nos.
 - 400 kV ICT bays: 2 nos.
 - 220 kV ICT bays: 2 nos.
- ii) 3 nos. 220 kV line bays for RE interconnection
 - 220 kV line bays: 3 nos.
- iii) 1x125 MVar bus reactor (2nd) at Kallam PS
 - 125 MVar, 420 kV Bus reactor – 1 no.
 - Bus reactor bay: 1 no.

2. SCOPE OF WORK

The scope of work shall cover following:

Design, engineering, supply, testing at manufacturer's works, transportation, unloading and delivery at site including insurance & storage, associated civil works, erection, testing and commissioning at site along with all equipments, fittings, accessories, foundation bolts (if any) cables, Mandatory Spare Parts and Condition Monitoring Instruments for Augmentation of Transformation capacity at Kallam PS on LSTK basis as per the details given below:

- i) Augmentation of Kallam Pooling Station by 2x500 MVA
 - 500 MVA, 400/220kV ICT: 2 nos.
 - 400 kV ICT bays: 2 nos.
 - 220 kV ICT bays: 2 nos.
- ii) 3 nos. 220 kV line bays for RE interconnection
 - 220 kV line bays: 3 nos.
- iii) 1x125 MVar bus reactor (2nd) at Kallam PS
 - 125 MVar, 420 kV Bus reactor – 1 no.

- Bus reactor bay: 1 no.

3. BID PRICE SCHEDULE:

The Bid Price Schedule is attached separately in Volume-III.

4. PHYSICAL AND OTHER PARAMETERS

4.1.Location of the substation - The location of substation is indicated below:

Name of Substation	Tentative Co-ordinates	Name of State	Address
Kallam PS	<ul style="list-style-type: none"> • 18°37'25.91"N, 75°52'12.40"E • 18°37'28.70"N, 75°52'13.44"E • 18°37'25.85"N, 75°52'22.07"E • 18°37'23.79"N, 75°52'21.33"E • 18°37'25.67"N, 75°52'15.56"E • 18°37'24.96"N, 75°52'15.29"E 	Maharashtra	Village- Selu, Tehsil- Washi, District- Dharashiv (erstwhile Osmanabad)-413507.

4.2.Access to Site -

KTL shall provide land for the said augmentation work at Kallam PS ("Site") with non-exclusive access and handover such portion of the Site to Contractor on as is basis to commence the services under the Contract.

The Contractor shall (and shall cause all its sub-contractors) use only the entrance(s) to the Site specified by KTL for ingress and egress of all Contractor's and its Subcontractors' personnel, the Services, Contractor's Equipment, vehicles and the like.

The Contractor shall be responsible for planning and conducting its operations and those of its Subcontractors so that neither the Contractor nor any of its Subcontractor shall (a) enter upon lands (other than the designated Site) or waterbodies in their natural state unless authorized by the Project Manager and or appropriate person; (b) close or obstruct any utility installation, highway, waterway, harbor, road or other property unless applicable permits are obtained and authorized by the Project Manager and or appropriate person; or (c) disrupt or otherwise interfere with the operation of any portion of any pipeline, telephone,

conduit or electric transmission line, ditch, navigational aid, dock or structure unless otherwise specifically authorized by the appropriate person.

4.3.Meteorological data - For design purposes, meteorological data are as below:

Altitude	Less than 1000 meter above mean sea level (MSL)
Snow Fall	NIL
Seismic Zone	As per IS 1893
Wind Zone	Wind map as per National Building Code - 2016 (Volume-I)
Min.-Max. Design Ambient Temperature	0-50 degree centigrade
Creepage Requirement	As per Technical Specification

4.4.Fault Level- The system fault level is as mentioned below:

Sl. No	Substation	400 kV	220 kV
1	Kallam PS	63kA for 1 second	50kA for 1 second

5. SCHEDULE OF QUANTITIES

This work is to be awarded on LSTK basis including Design, engineering, supply, testing at manufacturer's works, transportation, unloading and delivery at site including insurance & storage, associated civil works, erection, testing and commissioning at site along with all equipments, fittings, accessories, foundation bolts (if any) cables, Mandatory Spare Parts and Condition Monitoring Instruments.

The Contractor shall submit a detailed BOQ/ Billing Breakup, for Employer's review and approval, within 15 days of the Effective Date for billing and invoicing purpose, however the total price shall be restricted to the Contract Price.

The bidder is required to estimate the quantities required for execution and completion of works and incorporate their price in respective Bid Price Schedule. Bidder shall include all such items in the BOQ/ Billing Breakup, which are not specifically mentioned but are essential for the execution of the Contract. Items which are not mentioned in the BOQ/ Billing Breakup and required for successful commissioning of the Facilities shall be included in the Bid Price quoted by the bidder and shall be provided at no extra cost to the Employer.

The Format for BOQ has been annexed as Annexure- A(SOW).

6. REFERENCE DRAWINGS

Following drawings are enclosed for reference purpose of the Bidder.

1. Tentative Available Land Layout
2. Tentative Electrical Plan Layout
3. Existing CRB Equipment Layout Plan
4. Existing Outdoor Earthmat Layout Plan
5. Existing Outdoor Cable Trench Layout
6. Tentative SLD for Augmentation of Kallam PS
7. Existing System Architecture of Kallam PS
8. Indicative Drawings – Civil Works

Note: The layout of autotransformers shall depend on the substation layout arrangement and therefore shall be finalized during detailed engineering.

In case of any discrepancy between the drawings and text of specification, the requirements of text of specification shall prevail in general. However, the bidder is advised to get these clarified from the Employer.

7. DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

For the purpose of Scope of Work, Technical Specification shall consist of following sections, and they should be read in conjunction with each other.

1. Technical Specification for Substations – Civil Works.
2. Technical Specification for Substations – Electrical Works.

8. MANDATORY SPARE PARTS AND CONDITION MONITORING INSTRUMENTS

The Mandatory Spare Parts and Condition Monitoring Instruments shall be included in the bid proposal by the bidder. The prices of these spares/ instruments (as the case may be) shall be quoted by the Bidder in the Bid Price Schedule and shall be considered for evaluation of bid. The Bidder shall submit the detailed price breakup in the BOQ/ Billing Breakup. The list of Mandatory Spare Parts and Condition Monitoring Instruments is attached in Annexure- B(SOW) and Annexure-C (SOW) respectively.

The Bidder is clarified that no mandatory spares shall be used during the commissioning of the Facilities. Any spares required for commissioning purpose shall be arranged by the Contractor at its own expense. The unutilized spares, if any, brought for commissioning purpose shall be taken back by the Contractor.

9. SPECIFIC REQUIREMENT

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10. ANNEXURES

ANNEXURE- A(SOW)

Supply:

<u>S. No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Rate (including Freight and Insurance)</u>	<u>GST (INR)</u>	<u>Total Amount (INR)</u>

Service:

<u>S. No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Rate</u>	<u>GST (INR)</u>	<u>Total Amount (INR)</u>

ANNEXURE- B(SOW)

List of Mandatory Spare Parts

S. NO.	Description of Spare	Qty.
1.0	420kV & 245kV SF6 Circuit Breakers	
1.1	Complete Pole (Phase) of circuit breaker including closing resistor/ CSD, grading capacitor (as applicable), pole column, interrupter, operating mechanism, Marshalling Box and terminal connector but without support structure	1 No. pole of each make & type.
1.2	Grading Capacitor	3 Nos.
1.3	Rubber gaskets, 'O' rings and seals	1 set
1.4	Trip coils with resistor	2 sets
1.5	Closing coils with resistor	2 sets
1.6	Terminal Pads and connectors	2 sets
1.7	Molecular filter	2 Nos.
1.8	Density/pressure monitoring systems	1 No.
1.9	Corona rings	1 No.
1.10	Relays, Power contactors, switch fuse units, limit switches, push buttons, timers & MCB etc.	1 set
1.11	Pressure switches	1 set
1.12	Pressure Gauge and coupling	1 set
1.13	SF6 Gas	15% of total used quantity in substation
1.14	Auxiliary switch assembly	1 set
1.15	Operation Counter	1 No.
1.16	Magnetic ventile, if required	3 Nos.
1.17	Actuator rings, if required	6 Nos.
1.18	Control valves, if required	1 No.
1.19	Fixed, moving and arcing contact assemblies including Insulating Nozzles etc. for 1 Interrupter.	2 Nos.
1.20	Spring Operated Mechanism	
1.20.1	Closing Dashpot	1 set
1.20.2	Opening Dashpot	1 set
1.20.3	Opening Catch gear	1 set
1.20.4	Closing Catch gear	1 set
1.20.5	Complete Spring Operating Mechanism	1 set
1.22.6	Spring Charging Motor	1 Nos.
2.0	420kV & 245kV HDB ISOLATORS	
2.1	One complete pole including support Insulator, motor operating mechanism and terminal connector but excluding structure	1 No.
2.2	Isolator Arms with finger contacts and current carrying assembly	1 set

S. NO.	Description of Spare	Qty.
2.3	Support Insulators	1 set
2.4	Copper contact fingers for male & female contacts	2 sets
2.5	Open / Close contactor assembly, timers, key interlock push button switch & auxiliary switches	1 set
2.6	Limit switch	2 sets
2.7	Motor housing bearing assembly	1 No.
2.8	Terminal Pads and connectors	2 sets
2.9	Motor with gear assembly and bevel gear assembly	1 No.
2.10	Corona shield rings	3 Nos.
2.11	Hinge pins	3 Nos.
2.12	Bearings	1 set
2.13	Interlocking coil with resistor	5 Nos.
2.14	Fuses of each rating	5 Nos.
3.0	420kV & 245kV CURRENT TRANSFORMERS	
3.1	Complete CT with Terminal connector & structure	2 Nos. of each rating for a population up to 20 Nos. 3 Nos. of each rating for a population more than 20 Nos.
3.2	Primary Terminal bushing	2 sets
4.0	VOLTAGE TRANSFORMER (PT/CVT)	
4.1	Complete Potential Transformer/ Capacitor Voltage Transformer with terminal connectors & structure	2 Nos. of each rating for a population up to 20 Nos. 3 Nos. of each rating for a population more than 20 Nos.
5.0	SURGE ARRESTOR	
5.1	Complete Surge Arrester with insulating base and Terminal connector & structure	2 Nos. of each rating (not make) for a population up to 10 Nos. and 3 Nos. of each rating (not make) for population more than 10 Nos.
5.2	Surge counter/monitor	5 Nos.
6.0	400kV & 220kV BUS POST INSULATOR	
6.1	Bus post insulator assembly (Complete)	3 Nos. for each voltage rating
7.0	POWER TRANSFORMERS & REACTORS	
7.1	POWER TRANSFORMERS	
7.1.1	Oil cooler pumps with motor (complete assembly)	1 No.
7.1.2	Buchholz relay complete (main tank)	1 No.
7.1.3	Local Winding temperature indicator	1 No.

S. NO.	Description of Spare	Qty.
7.1.4	Remote winding temperature indicator with sensing device and matching unit	1 No.
7.1.5	Oil temperature indicator	1 No.
7.1.6	Pressure relief device	1 No.
7.1.7	Magnetic oil level gauge	1 No.
7.1.8	Cooler Fan with motor	1 No.
7.1.9	Set of Valves	1 No. of each size and type
7.1.10	Set of starters, contactors, relays and switches for electrical control panel	1 set
7.1.11	Remote tap position indicator	1 No.
7.1.12	Oil flow indicator with flow switch	1 set
7.1.13	Breather assembly for main conservator and OLTC Conservator	1 No. each
7.1.14	Terminal connector	1 set
7.1.15	Oil surge relay for OLTC	1 No.
7.2	SHUNT REACTORS	
7.2.1	Local winding temperature indicator	1 set
7.2.2	Remote winding temperature indicator with contacts and sensing device	1 set
7.2.3	OTI with contacts and sensing device	1 No.
7.2.4	Magnetic Oil level gauge	1 No.
7.2.5	Pressure relief device	1 No.
7.2.6	Buchholz relay complete	1 No.
7.2.7	Terminal connector	2 Nos. of each type/rating
7.2.8	Surge Arrester (connected in neutral of reactor) for each Rating Wherever applicable	1 No.
7.2.9	Surge monitor for neutral L.A. (Wherever applicable)	1 No.
7.2.10	Breather assembly	2 Nos.
7.2.11	Valves	1 set
7.3	BUSHINGS	
7.3.1	400 kV Bushing	2 Nos. of each Type (dimensional) & rating
7.3.2	245kV Bushing	1 No. of each rating & dimension for population up to 10 Bushings 2 Nos. of each rating & dimension for population more than 10 Bushings
7.3.3	72.5/52 KV bushings for tertiary	2 Nos.

S. NO.	Description of Spare	Qty.
7.4	INSULATING OIL	10% of quantity of oil of largest unit (20% in case imported oil is used in transformer / reactors)
8.0	PLCC EQUIPMENT	
8.1	Wave Trap LA	1 No.
9.0	Control Relay & Protection System	
9.1	Line Protection Panel Equipment Spare	
9.1.1	Numerical Relay (IED) of each make and type along with software	1 No.
9.2	Transformer & Reactor Protection Panel	
9.2.1	Numerical Relay (IED) of each make and type along with software	1 No.
10.0	Conductor (Flexible / Aluminium Pipe)	5% of the length of each type installed at the substation / switchyard
11.0	INSULATORS	
11.1	DISC INSULATORS (IF APPLICABLE)	5% of the total number of discs of each voltage class installed at the substation/switchyard.
11.2	LONG ROD INSULATORS	5% of the total number of insulators of each voltage class installed at the substation / switchyard subject to a minimum no. of 3 insulators of each voltage class.
12.0	CONDUCTOR ACCESSORIES AND HARDWARE	Qty. shall be commensurate with the spare for conductor and insulator.
13.0	COUPLING CAPACITORS	One number of each voltage class installed at the substation / switchyard
14.0	Clamps, Connectors, Shield Wire, CO2 type portable fire extinguishers, spacers, welding sleeves, corona bells,	5% of the total qty. of each type installed at the substation / switchyard with min. 1 no. of each item
15.0	Illumination System	5% of total qty. of each type of fixture installed at the substation /

S. NO.	Description of Spare	Qty.
		switchyard with min. 1 no. of each fixture type

ANNEXURE -C(SOW)

List of Condition Monitoring Instruments

S. No.	Name of the Device	Qty. (in No.)	Application
1	12kL Oil Filtration Machine	1	Oil Filtration of Transformer & Reactor
2	Vacuum Plant	1	Vacuuming of Transformer & Reactor, during oil filtration/repair /replacement
3	Dry Air Plant	1	Dry air filling inside Transformer & Reactor, during oil filtration / Repair / Replacement
4	Oil Tank with Tires	1	Storage of oil in case of ICT Replacement / Repair / Inspection.
5	Integrated Transformer Testing kit with a. Tan Delts with FDS b. WRM c. Ratio Test d. OLTC DCRM	1	Transformer, CT, CVT, CB Testing / Once in Two Year & SOS
6	Handheld PPM & Dew Point Meter	1	Time to time transformer Oil PPM & dry air dew point measurement
7	BDV Test Kit	1	Time to time BDV measurement of Transformer Oil
8	CT & CVT Analyzer	1	CT, CVT Testing / Once in Two Year & SOS
9	DCRM -6 Channels with Timing Card	1	Circuit Breaker Testing
10	CRM	1	Isolator & Circuit Breaker Testing
11	IR Tester - 10 KV	1	Transformer, CT, CVT, CB & Other Auxiliary Systems
12	Earth Resistance Meter with Clamp	1	Earth Pit Resistance Measurement
13	Protection Relay Test Kit with Advanced Distance, Advanced Differential & Transplay	1	For Testing of Protection Relays
14	PLCC Signal Level Meter	1	Measurement of PLCC Signal Loss
15	Battery Discharge Kit	1	Battery Discharge Test/Annual
16	SF6 Gas Handling, Evacuating, Storage & Refilling kit	1	For Handling of SF6 in Circuit Breakers

----- End of SOW -----