

## SUB-STATION SCOPE OF WORK

- a. NAME OF THE PACKAGE: **CPC-41/2023-24**
- b. TENDER SPEC NO.: **SGM-CPC-e-Tender-400 KV Neulpoi-41/2023-24**
- c. NAME OF THE WORK: Engineering, Supply, Erection, Testing and Commissioning of 2x500 MVA, 2 x 63 MVA, 400/220/33 KV Grid sub-station at Neulpoi, Dhenkanal with associated 400 KV DC LILO line from existing 400 KV Meramundali-New Duburi DC line to proposed Grid sub-station at Neulpoi and 400 KV DC LILO line from existing 400 KV Meramundali-Mendhasal DC line to proposed Grid sub-station at Neulpoi on EPC contract basis.
- d. FUNDING MECHANISM:-30% equity from Govt. and balance 70% loan will be arranged by OPTCL.
- e. TYPE OF GRID SUB-STATION/~~BAY EXTENSION~~: ~~GIS~~ / AIS: AIS
- f. MVA CAPACITY OF GRID SUB-STATION:- 2x500 MVA, 2 x 63 MVA
- g. VOLTAGE LEVEL OF GRID SUB-STATION:-400 KV
- h. PROJECT LOCATION & ITS ADDRESS: **Neulpoi** Village; Sub-Division ; **Dhenkanal** District; Nearest railway Station: Dhenkanal ; Nearest AIR Port: Bhubaneswar ; Distance from Capital City Bhubaneswar:-----

1. NAME OF THE OWNER: ODISHA POWER TRANSMISSION CORPORATION LIMITED.
2. NAME OF THE DIVISION UNDER WHICH THE WORK SHALL BE SUPERVISED:EHT(Construction) Division, Angul  
ADDRESS: Angul  
MOBILE NO./TELEPHONE NO.: **9438907169**
3. NAME OF THE CIRCLE UNDER WHICH THE WORK SHALL BE SUPERVISED: EHT (C) Circle, Bhubaneswar  
ADDRESS: Bhubaneswar  
MOBILE NO./TELEPHONE NO.:--
4. NAME OF THE ZONE UNDER WHICH THE WORK SHALL BE SUPERVISED: *CENTRAL ZONE, Bhubaneswar*  
ADDRESS: Bhubaneswar  
MOBILE NO./TELEPHONE NO.:-----

Following Transmission Line shall be terminated at this proposed Sub-station:

Sl. No.	Description of Line	Type & Configuration of conductors proposed/Used	Line Length in Km
1	400 KV D/C LILO LINE from 400KV Meramandali-New Duburi D/C line (CKT-I & II) to proposed 400/220/33KV Grid Sub-Station at Neulpoi (Meramundali End)	ACSR Moose	25.0 (Route KM)
2	400 KV D/C LILO LINE from 400KV Meramandali-New Duburi D/C line (CKT-I & II) to proposed 400/220/33KV Grid Sub-Station at Neulpoi.(New Duburi End)	ACSR Moose	25.0 (Route KM)
3	400 KV D/C LILO LINE from 400KV Meramandali-Mendhasal D/C line(CKT-I & II) to proposed 400/220/33KV Grid Sub-Station at Neulpoi.(Mendhasal End)	ACSR Moose	23.0 (Route KM)
4	400 KV D/C LILO LINE from 400KV Meramandali-Mendhasal D/C line(CKT-I & II) to proposed 400/220/33KV Grid Sub-Station at Neulpoi.(Meramundali End)	ACSR Moose	23.0 (Route KM)

### 1. GENERAL

- 1.1 Odisha Power Transmission Corporation Ltd. (OPTCL), a Govt. of Odisha Undertaking and a State Govt, PSU is responsible for bulk Power transmission of electrical energy from various Generating Unit through their own networking system comprises of Transmission Lines and Grid sub-stations, Interconnection with the IPP's & regional

grids are also part of its business. Transmitting the power to various utilities(discoms) and /beneficiaries are entrusted with OPTCL.

1.2 The execution of “Transmission Scheme for evacuation/supply of power from upcoming Industrial Park at Neulpoi (IDCO Solar Park)” as well as the whirling of power in the tune of \_\_\_\_\_ MW, its implementation through Competitive Bidding Process and on behalf of Govt. of Odisha, OPTCL invites bids for the above projects for successful implementation of the same.

1.3 OPTCL is now implementing following transmission system associated with Transmission system strengthening scheme for evacuation of power from - upcoming Industrial Park at Neulpoi (IDCO Solar Park)- to meet the requirement as projected above are highlighted below.

S.No.	Scope of the Transmission Scheme (Substation)
1	Establishment of 2x500 MVA, 2 x 63 MVA, 400/220/33 KV AIS/GIS Sub-station at NEULPOI , in the District of DHENKANAL, Odisha
2	Provision of <b>2 X 125 MVAR, 400 KV Bus Reactor</b>
3	Provision of _____ X _____ MVAR, _____ KV Switchable Line Reactors
4	Sub-station Automation

## 2. SCOPE

2.1 The scope of this specification covers the following:

S.No.	Scope of the Transmission Scheme (Substation)
1	Establishment of 2x500 MVA, 2 x 63 MVA, 400/220/33 KV AIS/GIS Sub-station at Neulpoi, in the district of Dhenkanal , Odisha, which is Under Transmission system strengthening scheme for evacuation of power from <b>Industrial Park at Neulpoi (IDCO Solar Park)</b>
2	<b>400 kV bays: 21 nos.</b> Feeder bay : 10 Nos. ICT bay : 2 nos. Reactor bay: 2nos. Tie bay : 7 nos.
3	_____ nos. _____ kV bays for _____ banks of _____ MVA, _____ / _____ / _____ kV, Auto/Power transformers
4	<b>220 kV Bays: 7 nos.</b> Feeder bay: 2 ns. ICT bay : 2 nos. Power Transformer : 2 nos. Bus coupler bay : 1 no.  33 KV Bays : 9 nos. Feeder Bay: 6 nos. Transformer Bay: 2 nos. Bus coupler Bay: 1 no.
5	_____ kV Transfer Bus coupler bay: _____ Nos.
6	_____ kV Tie bays: _____ Nos.
7	_____ kV switchable/non switchable Line Reactor Bay: _____ Nos.
8	_____ kV Bus Reactor Bay: _____ Nos.
9	Power / <del>Auto</del> Transformers
9a	2 X 40 MVA; 132/33- KV <del>Auto</del> /Power Transformer: 02 Nos.
9b	_____ X _____ MVA; _____ / _____ / _____ KV <del>Auto</del> /Power Transformer: _____ Nos.
10	<b>Reactor (Line/Bus)</b>
10a	_____ KV; _____ MVAR, bus reactor: _____ Nos.
10b	_____ KV; _____ MVAR, Line reactor: _____ Nos.

11	Besides above bay, provision of un-equipped future expansion bays are to be considered. (Minimum each voltage level 2 Nos. each)
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2.2 Design, engineering, manufacture, testing at manufacture's work, supply including transportation & insurance, unloading, storage, erection, testing and commissioning of following equipment and items at 400/220/33 KV, Neulpoi substation complete in all respect:

(1) Erection, testing and commissioning of (1) ~~2x500 MVA 400/220 KV ICT —X— MVA, / / kV Autotransformer~~, (2) 2 x 63 MVA, 220/33 kV Power transformer (3) 125 MVAR, 400 KV Bus Reactor ~~(4) —MVAR, —KV Line Reactor along with NGR (as applicable) and associated —kV Surge Arrester~~ are under this package(s). However, following associated works are covered under the scope of this package:

(a) Associated Civil works (foundations, oil sump pit, fire protection walls, foundation for Transformer MB, foundation for Cooler Control Cubicle, foundation for Cooler Banks, earthing connection to main earth mat, Treated Earth pits etc. as per technical specification) for (1) ~~2x500 MVA 400/220 KV ICT —X— MVA, / / kV Autotransformer~~, (2) 2 X 63 MVA, 220/33 kV **Power transformer**. This is being owner supply items.

(b) Associated Civil works (foundations, oil sump pit, fire protection walls, foundation for Transformer MB, foundation for Cooler Control Cubicle, foundation for Cooler Banks, earthing connection to main earth mat, Treated Earth pits etc. as per technical specification) for (1) 125MVAR, 400KV Bus Reactor (2) ~~—MVAR, —KV~~ **Line Reactor** along with NGR (as applicable) and associated ~~-----kV~~ Surge Arrester.

(c) Supply, erection, testing and commissioning of Circuit Breakers, Disconnectors, Current Transformers, Inductive/Capacitor Voltage Transformers, Lightning Arresters, conductors, spacers, Insulators, hardware & all terminal connectors, BPI, structure, etc. as required for Autotransformer/Power Transformers & Reactors bays. Overhead connection of HV and Neutral bushings of Autotransformer/Power Transformers & Reactor to substation equipment, which includes all terminal connectors.

(d) Supply, erection, testing and commissioning of HVWS & Hydrant Protection/NIFPES of all autotransformers/power transformers and Reactors & NGRs as per the provisioned.

(e) Supply, laying and termination of cables (control & power) along with associated accessories from Common marshalling box of Power/ Autotransformers & Reactors to associated BMK /Switchyard Panel Rooms/Control Room/ any other cubicle, as per requirement.

(f) Supply, erection, testing and commissioning of NGR Bypass arrangement for Line Reactors through ~~-----KV~~ Circuit Breakers, Bus Post Insulators along with associated support structures, clamps and connectors, conductors, spacers etc.

2.3 The detailed scope of work of the substation package is brought out in subsequent clauses of this section.

2.4 It is the intent of this specification to describe primary features, materials, and design & performance requirements and to establish minimum standards for the work. The specification is not intended to specify the complete details of various practices of manufactures/ bidders, but to specify the requirements with regard to performance, durability and satisfactory operation under the specified site conditions.

### 2.5 Other Equipment & Materials:

(a) Supply, erection, testing and commissioning of 420 kV/ 245 KV, SF6 Circuit Breakers along with structures, fittings and accessories for different bays as per requirement and technical specification.

~~(b) Supply, erection, testing and commissioning of 250 KVA, 33/0.433kV LT transformer along with associated 72.5kV class Circuit Breaker, 72.5kV Isolator, 72.5kV Current Transformer, Voltage Transformer (BIL as suitable for 72.5 KV), 72.5kV Bus post Insulators etc with other accessories for loading of tertiary windings of — MVA, / — kV Auto Transformer.~~

(c) Supply, erection, testing and commissioning of 250 KVA, 33/0.433kV LT transformer along with associated 33kV class Isolator, HG Fuse and 30kV Surge Arrester for connection to DISCOM/Own Power Supply.

~~(d) Supply, erection, testing and commissioning of 765/400 kV Circuit breakers, Isolators, Current Transformers, Capacitor Voltage transformers, IVT, BPI's , Surge Arresters and all associated materials etc including terminal connectors.~~

- (e) Supply, erection, testing and commissioning of 400/220/33 kV Circuit breakers, Isolators, Current Transformers, Capacitor Voltage transformers, IVT, BPI's , Surge Arresters and all associated materials etc including terminal connectors.
- (f) ~~Supply, erection, testing and commissioning of Controlled Switching device for 765kV & 400kV Circuit breakers as per BPS.~~
- (g) Supply, erection, testing and commissioning of -----kV Neutral CT for -----KV/-----KV/-----KV autotransformers / Reactors/Power Transformers banks- As per BPS.
- (h) ~~Supply, erection, testing and commissioning of 145kV, 1 Phase Circuit Breaker and BPI for NGR by passing arrangement for the line reactor.~~
- (i) Supply, erection, testing and commissioning of Complete Relay & Protection System as per Technical Specification & BPS- 'Control and Relay Panels'. Necessary equipment, wiring etc. required for control & monitoring of different bays (Line, Transformer/auto-transformer, Bus-coupler, Transformer Bus coupler, Tie etc) including 145kV Circuit Breaker for NGR by-passing arrangement is also in the scope of work. The same may be located in respective protection panels (Line, Transformer/auto-transformer, Bus-coupler, Transformer Bus coupler, Tie etc) including line/bus reactor panels.
- (j) Supply, erection, testing and commissioning of Complete Bus Bar Protection system for 400 kV; -----kV; -----kV; & -----kV Buses as per Technical Specification. The Bus bar protection system for new substation shall be decentralized (distributed) type. The Peripheral Units for Bays under present scope only are to be supplied. However, the Central Unit shall be supplied considering both present and Future Bays as per SLD.
- (k) Supply, erection, testing and commissioning of Complete Substation Automation System based on IEC-61850 as per Technical Specification of Substation Automation (including hardware and software) along with associated equipment is under present scope. Further, the contractor shall also supply necessary BCUs for control and monitoring of substation auxiliary system. The necessary interface and integration work for transferring data to SLDC (RSCC) and to any suitable location, which shall be intimated in due course of time.
- (l) Supply, erection, testing and commissioning of OLTE Digital Carrier Communication equipment including Digital protection coupler (suitable for interfacing with E1 port of SDH equipment), FODP on gantry, signal converters (if required), communication cables, associated power cables etc. for both ends of following lines:
- (1) 400 KV D/C Transmission Line
  - (2) -----KV D/C Transmission Line
  - (3) -----KV D/C Transmission Line
- (m) Supply, erection, testing and commissioning of 250kVA Silent type outdoor DG Set along with AMF panel.
- (n) Supply, erection, testing and commissioning of Air Conditioning System for Control Room Building, Battery room & Switchyard Panel Rooms and etc as per Technical Specification & BPS.
- (o) Supply, erection, testing and commissioning of 33kV HT cable along with termination kit, lugs, glands, clamps and complete accessories (if required for Station Transformer) etc. as per BPS.
- (p) Supply, erection, testing and commissioning of 1.1kV grade Power & Control cables along with complete accessories including power cables for oil filtration units with associated power receptacle; cabling from common marshalling box of 220/33 kV; ----- / -----KV Power Transformer /Auto Transformers & ----- kV & ----- KV Reactors (Bus/Line) to bay kiosks /Switchyard panel room /control room. Control & Power cables for other protection and respective panels (Line, Transformer/auto-transformer, Bus-coupler, Transformer Bus coupler, Tie etc). The Methodology for supply, installation & sizing of cables shall be as per TS & BPS.
- (q) Supply, erection, testing and commissioning of Fire protection system including:
- (1) HVWS & Hydrant system for 400/220-kV ICT ~~Auto Transformers~~; -----KV line Reactors and 400kV Bus Reactor
  - (2) Smoke detection, Fire alarm & Annunciation System for Switchyard panel rooms and Control Room building.
  - (3) Hydrant system for control building, FFPH, LT system etc.
  - (4) NIFPES for -400/220 KV & 220/33 KV ICT/ Power/~~Auto Transformers~~ including its accessories.
- (r) Supply, erection, testing and commissioning of LT switchgear (AC/DC Distribution boards) considering all present and future bays as per SLD provided, which is indicative only.

(s) Supply, erection, testing and commissioning of Lattice & Pipe Structure:

1. The scope includes fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of Beam, Tower, LM (as required) and equipment support structures including nuts, bolts, fasteners and foundation bolts complete in all respect. The proto corrected drawings along Technical Specification with BOM are to be submitted by the contractor to OPTCL for approval. The arrangement shall however not absolve the contractor from the responsibility of supply and erection of safe sound and durable structure.

2. Drawings of Beam, Tower, Lighting Mast and equipment support structures shall be provided by OPTCL. In the bid price schedule, the same are indicated in Metric Ton (MT) and shall be paid as per respective items of BPS. In case OPTCL does not have any structural drawings, contractor shall prepare the fabrication drawing based on the requirement and submit for approval. In case of equipment support structure, the attachment of stool and fixing of MOM box etc. shall be taken care by the contractor as per the requirement of the equipment.

3. Equipment support structure of tertiary and neutral formation for Transformers and Reactors shall be designed by the CONTRACTOR during detailed engineering. In the bid price schedule, the same are indicated as LOT (if required).

4. Circuit Breaker support structure shall be as per manufacturer's drawing, which is provided by the manufacturer.

(t) Supply, erection, testing and commissioning of Hardware, clamps & connectors, Conductor(s), spacers, Al tube & accessories of Al. tubes for different types of connection, bus-bar materials (as per SLD), cable trays, cable tray racks, cable end sealings at control room/switchyard room & covers, Bay MB, (including terminal connectors for 400/220 KV ICT & 220/33 KV Power ~~Power/Auto~~ transformer and 400 kV Reactors-& -----kV NCT, Junction box, earth wire, earthing material risers, auxiliary earthman (excluding main earth mat), buried cable trenches/pipes for equipment & lighting, cable supporting angles/channels, Insulating mats, cable sealing arrangement, insulator guy arrangement, all accessories etc. as required.

(u) Supply, erection, testing and commissioning of Insulator strings and associated hardware: Insulator strings and associated hardware fittings under present scope shall be provided by the contractor as per Bid Price Schedule (BPS).

(v) Supply, erection, testing and commissioning of the Batteries & Battery chargers shall be worked out by bidder for complete -----/----- KV Grid substation scope including future bays as specified. However, capacity of battery & Charges should not be less than as specified below:

Sl. No.	Battery Voltage	Type of cell	Battery Capacity in AH	Charger Type	Charger capacity in Amp for Float & Boost Mode
1	220 V	Plante	350	SCR based Float & Float Cum Boost	----- A for Float & ----- A for Boost
2	48 V	VRLA	300	-DO-	----- A for Float & ----- A for Boost
3					
4					

In case, calculated Capacity comes more than the above, Contractor shall supply the same, without any additional cost implication to Employer.

(w) Supply, erection, testing and commissioning of Main Earth mat, which shall be provided under present scope of work. All the equipment (including power/ autotransformers, Bus & Line Reactors associated SA, NGR & their auxiliary and 420kV Bus Reactors), other equipment besides transformers & reactors, LT station, FFPH, DG Set, Control room area, cable trenches, auxiliary earth mat for isolators, structures for all auxiliary buses etc. shall be earthed by connecting them to the main Earth mat etc as required for complete earthing of the entire grid Sub-station. Main earth mat shall be either using **75X10** mm GI Flat/25 mm Dia MS Rod/ 40 mm Dia MS Rod as per BPS. The auxiliary earth mat (1500 mmX 1500 mm with a spacing of 300 mm both way) for Isolators shall be with the same size of main earth mat materials.

(x) The lightning protection (DSLIP) for complete switchyard is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the structures being provided under present scope. In case, additional



structures (Lightning Masts) are required to meet the lightning protection, the contractor shall provide the same. The cost for providing lightning masts shall be measured in MT and paid under associated BPS item. Associated earthing materials, hardware etc. is deemed to be included under the respective bay Erection Hardware. The civil works shall be payable as per relevant item of BPS.

(y) Supply, erection, testing and commissioning of LED based Lighting for the complete switchyard area under present scope including lighting for streets, Control Room cum administrative building, Switchyard Panel Rooms, Fire Fighting Pump house, DG Set area, LT station area and security room.

(z) Supply, erection, testing and commissioning of Telecommunication equipment etc. as per BPS

1) The broad Scope of the procurement of FO based Communication Equipment shall include planning, designing, engineering, supply, transportation, insurance, delivery at site, unloading handling, storage, installation, termination, testing, training and demonstration for acceptance, commissioning and documentation for:

(i) Fibre Optic Approach Cable (FOAC) along with duct, GI pipe, GI Elbow, GI Flexible conduit and Fibre Optic Distribution Panel (FODP).

(ii) SDH Equipment along with suitable interfaces and line cards.

iii) All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,

(iv) System integration of all supplied subsystem.

(v) Integration with the existing communication system based on SDH (SDH is the International Telecommunication Union's Telecommunication Standardization Sector version of the Synchronous Optical Network (SONET) standard) and PDH (PDH stands for Plesiochronous Digital Hierarchy. It is a telecommunications network transmission technology designed for the transport of large data volumes across large-scale digital networks. In PDH, multiplexing of 2 Mbit/s signals into higher order multiplexed signals) of employer.

(vi) Integration of supplied subsystem with SCADA system, PLCC equipment, PABX of, VOIP (SIP compliant for voice).

(vii) Integration of new Communication equipment in the existing regional NMS (Network Management System (NMS), as name suggest, is a software tool that is generally used to manage and control network i.e. interconnected nodes. EMS usually manages single element or group of similar elements. Elements simply refers to node. NMS usually manages more than one network i.e. multiple networks.). All required support to existing NMS vendor for integration of new Communication equipment.

2) Supply, erection, testing and commissioning of PMU scope (**if applicable**): Refer BPS.

(i) The broad Scope of the procurement of PMU shall include planning, designing, engineering, supply, transportation, insurance, delivery at site, unloading, handling, storage, installation, termination, testing, integration and demonstration for acceptance, commissioning, and documentation for PMU as per BPS.

(ii) The PMUs shall comply with the latest version of IS 60255-118-1-2018 and IEEE C 37.118 protocols.

(iii) The PMUs shall be integrated with Phasor data Concentrator (PDC) at Regional Load Dispatch Centre (RLDC)/State Load Despatch Centre (SLDC)

(iv) The Bidder shall provide technical support at substation end for seamless integration of PMU with PDC at RLDC/SLDC. The integration work at RLDC/SLDC end will not be under the scope of the Bidder.

(**aa**) Supply, erection, testing and commissioning of Visual Monitoring system for watch and ward of substation premises as per Technical Specification. (**If applicable**: Refer the BPS)

(**bb**) Supply, erection, testing and commissioning of Any other work/ item/ design/ drawing required for completion of scope of works.

2.6 **Civil works**:(Following works to be carried out by the contractor):

1. The scope of civil work shall include but shall not be limited to the following as per BPS & some standard drawings as provided by OPTCL:

- a) Contractor to carry out the Soil Investigation work including soil resistivity of complete Sub-station done a fresh.
  - b) Site levelling as per contours provided by the contractor. HFL (Highest Flood Level) data shall be arranged by contractor for finalization of FGL (Finished Ground Level).
  - c) Slope Protection Works: Sectional details of dry-stone pitching/ RCC retaining wall, including slope protection layout drawing etc. shall be prepared by contractor.
  - d) Stone Packing (if required) beneath foundations etc. coming up on filled up earth.
  - e) Boundary Wall
  - f) Cable trenches, Road, Drains- The sectional details of cable trench, road, road crossings, drains etc. including cable trench layout, road layout & drain layout including and invert levels shall be developed by the contractor.
  - g) Switchyard fencing and switchyard gate.
  - h) Rain water harvesting units.
  - i) Structure and foundation for all tower, beam, Lighting Mast & all equipment support structures
  - j) Foundation of Transformers and Reactors including rail cum road, unloading platform, jacking pad, Oil pit/ common oil pit, pulling block, gratings etc. as per technical specification.
  - k) Firewalls for Transformers and Reactors.
  - l) Foundation of LT transformers & DG set.
  - m) Control Room Building.
  - n) Fire Fighting Pump House and Water Tank. (**If required** as per BPS)
  - o) Switchyard Panel Room. (**If required** as per BPS)
  - p) Security Hut and Main Gate.
  - q) Labour Hut.
  - r) Septic tank and soak pit for Control Room Building, Security Hut and Labour Hut.
2. The scope of civil work shall include but shall not be limited to the following based on drawings developed by the contractor:
- a) Stone spreading and anti-weed treatment in the switchyard. A layout for the same shall be developed by the contractor.
  - b) Structure and foundation for the equipment support structure of tertiary and neutral formation of Transformers and Reactors.
  - c) Switchyard drains and peripheral drains (along the plot boundary). Preparation of storm water drainage layout using standard sections.
  - d) Permanent water supply for Control Room Building, Fire Fighting Pump House Building, firefighting system, Security Hut and Labour Hut.
  - e) Laying of plumbing and external sewerage system for Control Room Building, Security Hut and Labour Hut.
  - f) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.
  - g) Any other item/design/drawing for completion of scope of works.

2.7 All work is to be done under this specification shall include all labour, plant, equipment, material and performance of all work necessary to complete installation and commissioning of switchyard. All apparatus, appliances, material and

labour etc. not specifically mentioned or included, but are necessary to complete the entire work or any portion of the work in compliance with the requirements implied in this specification is deemed to be included in the scope of contractor.

2.8 Before proceeding with the construction work the Contractor shall fully familiarize himself with the site conditions and General arrangements & scheme etc. Though the Employer shall endeavour to provide the information, it shall not be binding for the Employer to provide the same. The bidders are advised to visit the substation sites and acquaint themselves with the topography, infrastructure and also the design philosophy to be adopted, geographical location. The bidder shall be fully responsible for providing all equipment, materials, system and services specified or otherwise which are required to complete the construction and successful commissioning, operation & maintenance of the substation in all respects. All materials required for the Civil and construction/installation work including cement and steel and other associated materials shall be supplied by the Contractor. Complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor.

2.9 Design of substation and its associated electrical & mechanical auxiliaries systems includes preparation of single line diagram, electrical layout, foundation & cable trench layouts (including invert levels), erection key diagrams, direct stroke lightning protection, electrical and physical clearance diagrams, Control and protection schematics, wiring and termination schedules, design of firefighting system, outdoor lighting/illumination and other relevant drawings & documents required for engineering of all facilities within the fencing to be provided under this contract, are covered under the scope of the Contractor.

2.10 Employer has standardized its technical specification for various equipments and works for different voltage levels. Items, which are not applicable for the scope of this package as per schedule of quantities described in BPS, the technical specification for the items should not be referred to.

2.11 Contractor to make site & store office for the Employer's representative.

### 3. PHYSICAL AND OTHER PARAMETERS:

3.1 Meteorological data: The meteorological data are as below

Sl. No.	Description	Value
1	Altitude	Less than 1000 meter above mean sea level (MSL)
2	Snow fall	NIL
3	Seismic Zone	As per IS 1893
4	Wind Zone	As per IS 875 Part 3
5	Min./Max. Ambient Temperature	0 / 50 degree centigrade

3.2 Other parameters - For design purposes, following is to be considered:

Sl. No.	Description Substation	Value Fault level
1	765kV	50 kA for 1sec
2	400kV	63kA for 1sec
3	220 KV	50kA for 1sec
4	132 KV	40kA for 1sec
5	33 KV	31.5kA for 1 Sec

### 4.0 SCHEDULE OF QUANTITIES

The requirement of various items/equipment and civil works are indicated in Bid price Schedules. All equipment/items and civil works for which quantities has been given in the BPS shall be payable on unit rate basis. During actual execution, any variation in such quantities shall be dealt as per the tender condition. Wherever the quantities of items/works are indicated in Lot/Set, the bidder is required to estimate the quantity required for entire execution and completion of works and incorporate their price in respective Bid price schedules. Any material/works for the line item not specifically mentioned in the description in BPS, as may be required shall be deemed to be included in the line item itself. No cost compensation shall be considered on account of "Set/LOT/LS" items in any case of number of bays as specified in project remains unchanged. Bidder should include all such items in the bid proposal sheets, which are not specifically mentioned but are essential for the execution of the contract. Item which explicitly may not appear in various schedules and required



for successful commissioning of substation shall be included in the bid price and shall be provided at no extra cost to Employer.

### 5.0 SCHEMES FOR BUS ARRANGEMENT

Different voltage substation, shall be considered with the following arrangement (Bus Arrangement):

Sl. No.	Description of Sub-station	AIS	GIS
1	132/33 KV	Main & Transfer Bus Scheme	Two main Bus Scheme
2	220/132 KV	(a) Two main Bus Scheme with bye-pass arrangement (b) Two main Bus with one transfer Bus Scheme (c) One & half CB switching scheme with I- type/D(Π) type layout arrangement	Two main Bus Scheme
3	400/220 KV	One & half CB switching scheme with I- type/D(Π) type layout arrangement	One & half CB switching scheme layout arrangement
4	765/400 KV	One & half CB switching scheme with I- type layout arrangement	

The reference drawings, which form a part of the specifications, are given at drawing folder in the technical specification. The bidder shall maintain the phase to earth clearance, phase to phase clearance and sectional clearances, clearances between buses, bus heights but may alter the locations of equipment to obtain the statutory electrical clearances required for the substation.

### 6.0 DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

For the purpose of present scope of work, technical specification shall consist of following sections and they should be read in conjunction with each other.

Sl. No.	Description of Technical Specification	Remarks
1	As per TS	
2		
3		
4		
5		
6		
7		

### 7.0 SPECIFIC REQUIREMENT:

i) The specific requirements as mentioned under scope of work.

ii) OTI & WTI shall be integrated in SCADA through 4-20 mA signals.

iii) HTLS Conductors & Connector suitable for HTLS conductor are in the scope of contractor (if asked for as per BPS). Relevant type/performance test certificates for high current heat rise test shall be submitted, as per applicable standards/product specifications to confirm suitability of the offered material.

iv) Minimum specific creepage distance for insulator string/ long-rod insulators/outdoor bushings shall be 31 mm/kV. However, minimum specific creepage distance of other outdoor equipment shall be 25mm/kV in line with requirement of Technical Specification.

v) The switchgear shall be designed and specified to withstand operating conditions and duty requirements. The rated current of equipment shall be as mentioned below: Further, current rating of all equipment shall be the highest current rating required for connected line/ICT/Reactor/Transformer so that the system could operate without any constraint in case of outage of any bus bar.

Sl. No.	Description of bay	Different voltage level				
		765 KV	400 KV	220 KV	132 KV	33 KV
1	Bus Bar	4000A	4000A	3150A	2000A	2000A
2	Line bay	3150 A	3150 A	3150 A	1600 A	800 A

3	ICT bay/ Transformer Bay	3150 A	3150 A	3150 A	1600 A	1250 A
4	Bus Reactor Bay	3150 A	3150 A	3150 A	-	-
5	Switched Line Reactor Bay	3150 A	3150 A	3150 A	-	-
6	Bus-coupler/Bus Tie/Transfer coupler	3150 A	3150 A	3150 A	-	1250 A