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1.0 GENERAL

1.1. Power Grid Corporation of India Ltd. (POWERGRID), A Govt. of India Enterprise is responsible for Bulk Power Transmission of electrical energy from various central Govt. Power Projects to various utilities/ beneficiaries and interconnecting regional grids, operating, and maintaining the National Electrical Grid of India. It is established with mission of "We will become a Global Transmission Company with Dominant Leadership in Emerging Power Markets with World Class Capabilities by:

- World Class: Setting superior standards in capital project management and operations for the industry and ourselves
- Global: Leveraging capabilities to consistently generate maximum value for all stakeholders in India and in emerging and growing economies.
- Inspiring, nurturing and empowering the next generation of professionals.
- Achieving continuous improvements through innovation and state of the art technology.
- Committing to highest standards in health, safety, security, and environment.

1.2. POWERGRID is implementing the following Transmission Schemes through RTM Route:

(i) North Eastern Region Expansion Scheme-XXIII (NERES-XXIII):

- Extension at 132kV Pasighat (DoP-AP) S/S :1 no. 132kV AIS line bay for termination of 2nd circuit of Pasighat (Arunachal Pradesh) – Roing (POWERGRID) 132kV D/c line.
- Extension at 132 kV Roing (PG) S/S: 2 no. 132kV AIS line bay for termination of 2nd circuit of Pasighat (Arunachal Pradesh) – Roing (POWERGRID) 132kV D/c line and 2nd circuit of Roing (POWERGRID) – Tezu (POWERGRID) 132kV D/c line.
- Extension at 132kV Tezu (PG) S/S: 2 no. 132kV AIS line bay for termination of 2nd circuit of Roing (POWERGRID) – Tezu (POWERGRID) 132kV D/c line and 2nd circuit of Tezu (POWERGRID) – Namsai (POWERGRID) 132kV D/c line.
- Extension at 132kV Namsai (PG) S/S: 1 no. 132kV AIS line bay for termination of 2nd circuit of Tezu (POWERGRID) – Namsai (POWERGRID) 132kV D/c line.

(ii) North Eastern Region Expansion Scheme 29 Part A:
Following Transmission System is envisaged under NERES 29 Part A "Installation of new 1x50MVA, 132/33kV ICT at Namsai (POWERGRID) S/s along with associated bays" through RTM route:

A. 50MVA, 132/33kV ICT: 1 no .

B. 132kV ICT bays: 1 no.

C. 33kV ICT bays: 1 no

1.3. It is the intent of this specification to describe primary features, materials, 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.

1.4. The work to be done under this specification shall include all labour, plant, equipment, material, and performance of all work necessary for the 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.

1.5. 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 endeavor 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. 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 shall be supplied by the Contractor.

Complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor.

2.0 SCOPE OF WORK

2.1 The broad scope of this specification covers **AIS Substation Package SS-02** as described below:

(i) Under package **NERES-XXIII** , extension work at following existing substations are envisaged:

A. Extn. Of 132 kV Pasighat (DoP-AP) s/s with the following bays:
- 1 no. 132kV AIS line bay for termination of 2nd circuit of Pasighat (Arunachal Pradesh) – Roing (POWERGRID) 132kV D/c line.

B. Extn. Of 132 kV Roing (PG) s/s with the following bays:
- 1 no. 132kV AIS line bay for termination of 2nd circuit of Pasighat (Arunachal Pradesh) – Roing (POWERGRID) 132kV D/c line.
- 1 no. 132kV AIS line bay for termination of 2nd circuit of Roing (POWERGRID) – Tezu (POWERGRID) 132kV D/c line.

C. Extn. Of 132 kV Tezu (PG) s/s with the following bays:

- 1 no. 132kV AIS line bay for termination of 2nd circuit of Roing (POWERGRID) – Tezu (POWERGRID) 132kV D/c line.
- 1 no. 132kV AIS line bay for termination of 2nd circuit of Tezu (POWERGRID) – Namsai (POWERGRID) 132kV D/c line.

D. Extn. Of 132 kV Namsai (PG) s/s with the following bays:
- 1 no. 132kV AIS line bay for termination of 2nd circuit of Tezu (POWERGRID) – Namsai (POWERGRID) 132kV D/c line.

(ii) Under package **NERES-29 Part A** , extension work at following existing substations are envisaged:

A. Installation of new 1x50MVA, 132/33kV ICT at Namsai (POWERGRID) S/s along with associated bays:

1. 50MVA, 132/33kV ICT: 1 no .
2. 132kV ICT bays: 1 no.
3. 33kV ICT bays: 1 no

2.2 DEAILED SCOPE OF WORK

The detailed scope of work for substations under Substation Package- **NERES-XXIII & NERES-29 Part A** are described below:

2.2.1 EXTENSION OF 132kV PASIGHAT (DOP-AP) SUBSTATION

- Switching Scheme: Single Main and Transfer Bus Scheme.
- Fault Level: 31.5 kA for 1 sec

The existing 132kV Pasighat (DoP-AP) is conventional type Substation having Single Main and Transfer Bus scheme Arrangement. The new 132kV Roing Line-2 Bay under present scope is envisaged adjacent to existing 132kV Roing Line-1 Bay.

(I) Design, engineering, manufacture, testing, supply to site, including transportation & insurance, unloading, storage, erection, testing, and commissioning of the following equipment/items complete in all respects:

(a) **132kV Voltage Class AIS Equipments (As per BPS):** Circuit breakers, Isolators, Current transformers, Surge arresters, Capacitor voltage transformers, Bus post Insulators as per BPS.

(b) **Control, Relay & Protection System (As per BPS):** Complete Control, Relay & Protection system for bays under present scope as per Section- Control & Relay

Panels. Bidder shall be required to match Control & Relay panel with the existing panel which are Duplex Type.
Augmentation of 132kV Bus Bar protection is not envisaged under present scope.

- All required I/O points, from the bays under present scope, shall be wired to existing **RTU** (Make & Model shall be intimated during detail engineering) for sending data to SLDC/NERLDC.

(c) **Main Earthmat (As per BPS):** Main Earthmat is already present (spacing 4.5 m X 4.5m) and the drawing is attached in the tender documents. The same needs to be extended for line terminal equipment, envisaged to be placed in line with tender drawing.
However, All the equipment's, all Gantry support structures, equipment's structures, cable trenches, auxiliary earth mat for isolators/Earth Switches etc. shall be earthed by connecting them to the main Earthmat & cost of the same is deemed to be included in the respective BPS items of Erection Hardware.

(d) **Illumination (As per BPS)**: LED based lighting and illumination for the switchyard area under present scope, shall be provided by the contractor.

(e) **1.1 kV grade Power & Control cables:** 1.1 kV grade Power & Control cables (and special cables, if any) along with complete accessories. Methodology for supply, installation & sizing of cables shall be as per Specific requirement. Methodology for supply, installation & sizing of cables shall be as per Specific Requirement at **Annexure-II.**

(f) **ACDC system**: Necessary AC/DC feeders are available at 132kV Pasighat Substation. Bidders scope shall cover Supply, laying & termination of AC & DC cables as per requirement for the bays under present scope. Payment shall be regulated as per associated BPS items under 1.1 kV grade Power & Control cables.

(g) **Lattice structures (galvanized):** Fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of tower and equipment support structures including foundation bolts complete in all respect. Standard Equipment support structures except CB support structure, shall be provided as per Employer's drawings. CB support structure shall be as per CB manufacturer's design. Proto-corrected drawings and Bill of Materials of all structures like towers, beams, equipment support structures etc. shall be in the scope of the Contractor.
All non-standard structures shall be designed by the contractor considering wind speed as per NBCC 2016 and put-up for approval of the Employer during detailed engineering.

(h) **Erection Hardware (As per BPS) :** The erection hardware which include Insulator strings and hardware, clamps & connectors including equipment connectors, spacers, Aluminum tube, conductor, Bus bar materials, earthing materials, risers, auxiliary earthmat (excluding main earthmat), Earth wire, Bay marshalling box, cable supporting angles/channels, Cable trays and covers, Junction box, buried cable

trenches, PVC pipes for cabling of equipment & lighting, Cable sealing arrangement, and all accessories etc. as per requirement.

The lightning protection (DSLP) for the switchyard area under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the existing structure and the structures being provided under present scope and earth wire. All associated hardware are to be regulated as per associated BPS items under "Erection H/W-132kV SMT Line Bay".

(i) Any other equipment/material required for completing the specified scope, shall be included in the scope of supply and the offer should be complete & comprehensive.

(j) **TELE-COMMUNICATION EQUIPMENT**

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 following:

i. SDH Equipment along with suitable interfaces and line cards.
ii. All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
iii. System integration of all supplied subsystem
iv. Integration with the existing communication system based on SDH and PDH of employer
v. Integration of supplied subsystem with SCADA system, PLCC equipment, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
vi. Fibre Optic Approach Cable (FOAC) along with Duct, GI PIPE, GI Elbow, GI FLEXIBLE CONDUIT and Fibre Optic Distribution Panel (FODP)
vii. Integration of new Communication equipment in the existing regional NMS. All required support to existing NMS vendor for integration of new Communication equipment.

(II) Design, engineering, manufacture, testing, supply including transportation, insurance & storage & testing at site of **mandatory spare**s as per **Bid Price Schedule (BPS)**.

(III) **Civil works -** The scope of work shall include but not be limited to the following: -

i) The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report.

ii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by the contractor:**

a) Soil Investigation shall be carried out on soil parameters from 2 nos. of bore holes only.

b) Site levelling work: The work includes Contouring of entire plot area within the substation boundary however area to be levelled shall be decided during detailed engineering.

c) Structure and foundation for all Non-standard gantry structures & equipment support structures.

d) Stone spreading, anti-weed treatment and 75mm thick PCC (1:5:10) in the switchyard. A layout for the same shall be developed by the contractor & shall be submitted to the employer for approval.

e) Removal, cleaning and washing of existing stone and re-spreading after doing anti-weed as per Section-Civil Works is in the scope of contractor wherever stone is laid in the area under present scope.

f) Cable trenches, sump pits, culverts etc. The cable trench layout including invert levels shall be developed by the contractor.

g) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.

h) The design & execution of retaining wall shall be in the scope of contractor and the same shall be paid under items such as excavation, PCC, RCC, reinforcement steel, etc. shall be measured and paid under respective items of BPS.

i) Any other item/design/drawing for completion of scope of works.

iii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by POWERGRID:**

a) Structure and foundation for all standard equipment support structures.

b) Cable trenches, Road, Drains- The sections details of cable trench, road, road crossings, drains etc. shall be provided by Employer. However, cable trench layout, road & drain layout including invert levels shall be developed by the contractor and be approved by Employer.

2.2.2 EXTENSION OF 132kV ROING (PG) SUBSATION

- Switching Scheme: Single Main and Transfer Bus Scheme.
- Fault Level: 31.5 kA for 1 sec

The existing 132kV Roing (PG) Substation is having Single Main and Transfer Bus Arrangement. The new 132kV Pasighat Line-2 Bay & 132kV Tezu Line-2 Bay under present scope is envisaged adjacent to existing 132kV Pasighat Line-1 Bay & 132kV Tezu Line-1 Bay, respectively.

(I) Design, engineering, manufacture, testing, supply to site, including transportation & insurance, unloading, storage, erection, testing, and commissioning of the following equipment/items complete in all respects:

(a) **132kV Voltage Class AIS Equipments (As per BPS):** Circuit breakers, Isolators, Current transformers, Surge arresters, Capacitor voltage transformers, Bus post Insulators.

(b) **Control, Relay & Protection System (As per BPS):** Complete Control, Relay & Protection system for bays under present scope as per Section- Control & Relay Panels. Bidder shall be required to match Control & Relay panel with the existing panel.

Retrofitting of existing Bus Bar with new Bus Bar is envisaged. The existing 132kV bus bar protection system is of SIEMENS make (Model: 7SS522 for Central Unit; Model: 7SS525 for Peripheral Unit). The Scope shall cover replacing of these peripheral units and central unit from existing panels with new peripheral unit and central unit including necessary modifications, wiring, and commissioning for completion of the bus bar protection scheme. Any modification required in the existing protection scheme is also included in the present scope.

(c) **Substation Automation System (SAS):**

- The 132/33kV Roing Substation is equipped with substation automation system based on IEC 61850 (make: **M/s Schneider**). Under present scope of contract, complete system needs to be upgraded, including provision for the bays under present scope.
- The offered system shall be based on IEC 61850 (bay as defined in technical specification, Sec.-Substation Automation) including future bays as per SLD (only Software capacity with licenses for future feeders envisaged).
- Under present scope, existing IED/BCUs of 132kV and Aux. System are envisaged to be retained & shall be integrated with upgraded SAS Gateway over IEC 61850 protocols under present scope.

- **Scope shall include**:

i) Up-gradation of Complete IEC 61850 based Substation automation system.

The detailed scope of work is as below:

a. Gateway: Supply and Installation of 2 Nos Gateway for remote monitoring and control via industrial grade hardware (to RCC) through Secure IEC 60870-5-104 protocol and complete database configuration & integration for at least **6 remote control centers**.
b. 2 Nos Station Human Machine Interface (HMI)
c. 2 Nos industrial grade servers.
d. 1 No DR / Engineering PC, as specified.

e. Inverters.
f. Printers as specified.
g. Supply of 2 nos. Router and Firewall is also covered in present scope.
h. License, software etc. required for up-gradation of SAS (Substation Automation System) are to be handed over to POWERGRID after successful commissioning.
i. Complete Database configuration for local HMI and Remote-Control Center shall be as per data list given by POWERGRID at the time of detail engineering.

ii) Bidders to supply the required additional BCUs for incorporation of the New 132kV bays (Under present scope) and to quote accordingly.

iii) All other necessary hardware and software to integrate the new SAS with the existing & New System shall be under bidder's scope.

iv) Necessary interface equipment (Router, Firewall, Ethernet Switches etc.) and integration work for transferring data to NERLDC (RSCC)/NLDC/National Transmission Asset Management Centre (NTAMC) at Manesar through optical fiber based SDH communication link is also under present scope. However, no work is envisaged at remote end (NERLDC/NLDC/NTAMC/RTAMC etc.) under the present scope.

v) Integration of IEC61850 communication-based monitoring equipment like Digital RTCC, online drying system, DGA etc. (as applicable) for existing (As per SLD-tender Drawing provided) 132/33kV Transformers banks, 132kV Reactor banks, with offered substation automation system is also included in the present scope.

(d) **PLCC Equipment (As per BPS):** Digital Protection coupler for both ends of following transmission lines:

- 132kV D/C Pasighat (DoP, AP) – Roing (PG) line.
- 132kV D/C Roing (PG) – Tezu (PG) line.

Cabling between DPC & Communication equipment (for E1 interface) at both ends shall be in present scope. All the digital protection couplers in a substation shall separately be mounted on a panel to be supplied.

(e) **Main Earthmat (As per BPS):** Main Earthmat in the switchyard area is already existing and the same needs to be extended under present scope. **The existing earthmat drawing is enclosed** in the tender drawings. Main earthmat shall be paid separately, as per actual laid quantity.

All the equipments, all Gantry support structures, equipment's structures, cable trenches, auxiliary earth mat for isolators/Earth Switches etc. shall be earthed by connecting them to the main Earthmat & cost of the same is deemed to be included in the respective BPS items of Erection Hardware.

(f) **Illumination (As per BPS)**: LED based lighting and illumination for the switchyard area under present scope, shall be provided by the contractor.

(g) **1.1 kV grade Power & Control cables:** 1.1 kV grade Power & Control cables (and special cables, if any) along with complete accessories. Methodology for supply, installation & sizing of cables shall be as per Specific requirement. Methodology for supply, installation & sizing of cables shall be as per Specific Requirement at **Annexure-II.**

(h) **ACDC system**: Necessary AC/DC feeders are available at 132kV Roing (PG) Substation. Bidders scope shall cover Supply, laying & termination of AC & DC cables as per requirement for the bays under present scope. Payment shall be regulated as per associated BPS items under 1.1 kV grade Power & Control cables.

(i) **Lattice structures (galvanized):** Fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of tower and equipment support structures including foundation bolts complete in all respect. Standard Equipment support structures except CB support structure, shall be provided as per Employer's drawings. CB support structure shall be as per CB manufacturer's design. Proto-corrected drawings and Bill of Materials of all structures like towers, beams, equipment support structures etc. shall be in the scope of the Contractor.
All non-standard structures shall be designed by the contractor considering wind speed as per NBCC 2016 and put-up for approval of the Employer during detailed engineering.

(j) **Erection Hardware (As per BPS) :** The erection hardware which include Insulator strings and hardware, clamps & connectors including equipment connectors, spacers, Aluminum tube, conductor, Bus bar materials, earthing materials, risers, auxiliary earthmat (excluding main earthmat), Earth wire, Bay marshalling box, cable supporting angles/channels, Cable trays and covers, Junction box, buried cable trenches, PVC pipes for cabling of equipment & lighting, Cable sealing arrangement, and all accessories etc. as per requirement.

The lightning protection (DSLP) for the switchyard area under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the existing structure and the structures being provided under present scope and earth wire. All associated hardware are to be regulated as per associated BPS items under "Erection H/W-132kV SMT Line Bay".

(k) **132kV Bus Works:**132kV Transfer Bus Extension for 03no. 132kV Bays (one present and two future bays), is envisaged under present scope as indicated in the tender drawings.

(l) Any other equipment/material required for completing the specified scope, shall be included in the scope of supply and the offer should be complete & comprehensive.

(m)**TELE-COMMUNICATION EQUIPMENT**

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 following:

i. SDH Equipment along with suitable interfaces and line cards.
ii. All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
iii. System integration of all supplied subsystem
iv. Integration with the existing communication system based on SDH and PDH of employer
v. Integration of supplied subsystem with SCADA system, PLCC equipment, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
vi. Fibre Optic Approach Cable (FOAC) along with Duct, GI PIPE, GI Elbow, GI FLEXIBLE CONDUIT and Fibre Optic Distribution Panel (FODP)
vii. Integration of new Communication equipment in the existing regional NMS. All required support to existing NMS vendor for integration of new Communication equipment.

(II) Design, engineering, manufacture, testing, supply including transportation, insurance & storage & testing at site of **mandatory spare**s as per **Bid Price Schedule (BPS)**.

(III) **Civil works -** The scope of work shall include but not be limited to the following: -

i) The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report.

ii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by the contractor:**

a) Site levelling work: The work includes Contouring of entire plot area within the substation boundary however area to be levelled shall be decided during detailed engineering.

b) Stone spreading, anti-weed treatment and 75mm thick PCC (1:5:10) in the switchyard. A layout for the same shall be developed by the contractor & shall be submitted to the employer for approval.

c) Removal, cleaning and washing of existing stone and re-spreading after doing anti-weed as per Section-Civil Works is in the scope of contractor wherever stone is laid in the area under present scope.

d) Cable trenches including cable trenches in Transformer area along with covers including road/rail crossing, sump pits, culverts etc. The cable trench layout including invert levels shall be developed by the contractor.

e) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.

f) Preparation of storm water drainage layout using POWERGRID standard sections.

g) All roads as per the layout. The road layout shall be developed by the contractor.

h) The design & execution of retaining wall shall be in the scope of contractor and the same shall be paid under items such as excavation, PCC, RCC, reinforcement steel, etc. shall be measured and paid under respective items of BPS.

i) Buried cable trench for HT cables (as per BPS).

j) Dismantling of existing switchyard fence.

k) Any other item/design/drawing for completion of scope of works.

iii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by POWERGRID:**

a) Structure and foundation for all standard gantry structures & equipment support structures.

b) Cable trenches, Road, Drains- The sections details of cable trench, road, road crossings, drains etc. shall be provided by Employer. However, cable trench layout, road & drain layout including invert levels shall be developed by the contractor and be approved by Employer.

c) Switchyard fencing as per Employer drawings complete in all respect.

2.2.3 EXTENSION OF 132kV TEZU (PG) SUBSTATION

- Switching Scheme: Single Main and Transfer Bus Scheme.
- Fault Level: 31.5 kA for 1 sec

The existing 132kV Tezu (PG) Substation is having Single Main and Transfer Bus Arrangement. The new 132kV Roing Line-2 Bay & 132kV Namsai Line-2 Bay under present scope is envisaged adjacent to existing 132kV Roing Line-1 Bay & 132kV Namsai Line-1 Bay, respectively.

(I) Design, engineering, manufacture, testing, supply to site, including transportation & insurance, unloading, storage, erection, testing, and commissioning of the following equipment/items complete in all respects:

(a) **132kV Voltage Class AIS Equipments (As per BPS):** Circuit breakers, Isolators, Current transformers, Surge arresters, Capacitor voltage transformers, Bus post Insulators.

(b) **Control, Relay & Protection System (As per BPS):** Complete Control, Relay & Protection system for bays under present scope as per Section- Control & Relay Panels. Bidder shall be required to match Control & Relay panel with the existing panels.

Presently, there is no bus bar protection for 132kV bays at Tezu S/s. Under present scope new Busbar Protection (low impedance type) for 132kV bays as per SLD (Existing bays, present bays and future bays) is envisaged. Both low impendence type Centralized or distributed busbar protection scheme is acceptable. However, for centralized Bus Bar Protection scheme, separate LBB protection relay for bay under present scope shall be provided.

(c) **Substation Automation System (SAS):**

- The 132/33kV Tezu Substation is equipped with substation automation system based on IEC 61850 (make: **M/s Schneider**). Under present scope of contract, complete system needs to be upgraded, including provision for the bays under present scope.
- The offered system shall be based on IEC 61850 (bay as defined in technical specification, Sec.-Substation Automation) including future bays as per SLD (only Software capacity with licenses for future feeders envisaged).
- Under present scope, existing IED/BCUs of 132kV and Aux. System are envisaged to be retained & shall be integrated with upgraded SAS Gateway over IEC 61850 protocols under present scope.

- **Scope shall include**:

i) Up-gradation of Complete IEC 61850 based Substation automation system.

The detailed scope of work is as below:

a. Gateway: Supply and Installation of 2 Nos Gateway for remote monitoring and control via industrial grade hardware (to RCC) through Secure IEC 60870-5-104 protocol and complete database configuration & integration for at least **6 remote control centers**.
b. 2 Nos Station Human Machine Interface (HMI)
c. 2 Nos industrial grade servers.
d. 1 No DR / Engineering PC, as specified.
e. Inverters.
f. Printers as specified.
g. Supply of 2 nos. Router and Firewall is also covered in present scope.
h. License, software etc. required for up-gradation of SAS (Substation Automation System) are to be handed over to POWERGRID after successful commissioning.
i. Complete Database configuration for local HMI and Remote-Control Center shall be as per data list given by POWERGRID at the time of detail engineering.

ii) Bidders to supply the required additional BCUs for incorporation of the New 132kV bays (Under present scope) and to quote accordingly.

iii) All other necessary hardware and software to integrate the new SAS with the existing & New System shall be under bidder's scope.

iv) Necessary interface equipment (Router, Firewall, Ethernet Switches etc.) and integration work for transferring data to NERLDC (RSCC)/NLDC/National Transmission Asset Management Centre (NTAMC) at Manesar through optical fiber based SDH communication link is also under present scope. However, no work is envisaged at remote end (NERLDC/NLDC/NTAMC/RTAMC etc.) under the present scope.

v) Integration of IEC61850 communication-based monitoring equipment like Digital RTCC, online drying system, DGA etc. (as applicable) for existing (As per SLD-tender Drawing provided) 132/33kV Transformers banks, 132kV Reactor banks, with offered substation automation system is also included in the present scope.

(d) **PLCC Equipment (As per BPS):** Digital Protection coupler for both ends of following transmission line:

- 132kV D/C Tezu (PG) – Namsai (PG) line.

(e) **Main Earthmat (As per BPS):** Main Earthmat in the switchyard area is already existing and the same needs to be extended under present scope. The existing **earthmat drawing is enclosed** in the tender drawings. Main earthmat shall be paid separately, as per actual laid quantity.

All the equipments, all Gantry support structures, equipment's structures, cable trenches, auxiliary earth mat for isolators/Earth Switches etc. shall be earthed by connecting them to the main Earthmat & cost of the same is deemed to be included in the respective BPS items of Erection Hardware.

(f) **Illumination (As per BPS)**: LED based lighting and illumination for the switchyard area under present scope, shall be provided by the contractor.

(g) **1.1 kV grade Power & Control cables:** 1.1 kV grade Power & Control cables (and special cables, if any) along with complete accessories. Methodology for supply, installation & sizing of cables shall be as per Specific requirement. Methodology for supply, installation & sizing of cables shall be as per Specific Requirement at **Annexure-II.**

(h) **ACDC system**: Necessary AC/DC feeders are available at 132kV Roing (PG) Substation. Bidders scope shall cover Supply, laying & termination of AC & DC cables as per requirement for the bays under present scope. Payment shall be regulated as per associated BPS items under 1.1 kV grade Power & Control cables.

(i) **Lattice structures (galvanized):** Fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of tower

and equipment support structures including foundation bolts complete in all respect. Standard Equipment support structures except CB support structure, shall be provided as per Employer's drawings. CB support structure shall be as per CB manufacturer's design. Proto-corrected drawings and Bill of Materials of all structures like towers, beams, equipment support structures etc. shall be in the scope of the Contractor.
All non-standard structures shall be designed by the contractor considering wind speed as per NBCC 2016 and put-up for approval of the Employer during detailed engineering.

(j) **Erection Hardware (As per BPS) :** The erection hardware which include Insulator strings and hardware, clamps & connectors including equipment connectors, spacers, Aluminum tube, conductor, Bus bar materials, earthing materials, risers, auxiliary earthmat (excluding main earthmat), Earth wire, Bay marshalling box, cable supporting angles/channels, Cable trays and covers, Junction box, buried cable trenches, PVC pipes for cabling of equipment & lighting, Cable sealing arrangement, and all accessories etc. as per requirement.
The lightning protection (DSLP) for the switchyard area under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the existing structure and the structures being provided under present scope and earth wire. All associated hardware are to be regulated as per associated BPS items under "Erection H/W-132kV SMT Line Bay".

(k) **132kV Bus Works:**132kV Transfer Bus Extension for 03no. 132kV Bays (one present and two future bays), is envisaged under present scope as indicated in the tender drawings.

(l) Any other equipment/material required for completing the specified scope, shall be included in the scope of supply and the offer should be complete & comprehensive.

(m)**TELE-COMMUNICATION EQUIPMENT**

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 following:

i. SDH Equipment along with suitable interfaces and line cards.
ii. All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
iii. System integration of all supplied subsystem
iv. Integration with the existing communication system based on SDH and PDH of employer
v. Integration of supplied subsystem with SCADA system, PLCC equipment, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
vi. Fiber Optic Approach Cable (FOAC) along with Duct, GI PIPE, GI Elbow, GI FLEXIBLE CONDUIT and Fiber Optic Distribution Panel (FODP)

vii. Integration of new Communication equipment in the existing regional NMS. All required support to existing NMS vendor for integration of new Communication equipment.

(II) Design, engineering, manufacture, testing, supply including transportation, insurance & storage & testing at site of **mandatory spare**s as per **Bid Price Schedule (BPS)**.

(III) **Civil works -** The scope of work shall include but not be limited to the following: -

i) The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report.

ii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by the contractor:**

a) Site levelling work: The work includes Contouring of entire plot area within the substation boundary however area to be levelled shall be decided during detailed engineering.

b) Stone spreading, anti-weed treatment and 75mm thick PCC (1:5:10) in the switchyard. A layout for the same shall be developed by the contractor & shall be submitted to the employer for approval.

c) Removal, cleaning and washing of existing stone and re-spreading after doing anti-weed as per Section-Civil Works is in the scope of contractor wherever stone is laid in the area under present scope.

d) Cable trenches including cable trenches in Transformer area along with covers including road/rail crossing, sump pits, culverts etc. The cable trench layout including invert levels shall be developed by the contractor.

e) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.

f) Preparation of storm water drainage layout using POWERGRID standard sections.

g) All roads as per the layout. The road layout shall be developed by the contractor.

h) The design & execution of retaining wall shall be in the scope of contractor and the same shall be paid under items such as excavation, PCC, RCC, reinforcement steel, etc. shall be measured and paid under respective items of BPS.

i) Buried cable trench for HT cables (as per BPS).

j) Any other item/design/drawing for completion of scope of works.

iii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by POWERGRID:**

a) Structure and foundation for all standard gantry structures & equipment support structures.

b) Cable trenches, Road, Drains- The sections details of cable trench, road, road crossings, drains etc. shall be provided by Employer. However, cable trench layout, road & drain layout including invert levels shall be developed by the contractor and be approved by Employer.

2.2.4 EXTENSION OF 132kV NAMSAI (PG) SUBSATION

- Switching Scheme: Single Main and Transfer Bus Scheme.
- Fault Level: 31.5 kA for 1 sec

The existing 132kV Namsai (PG) Substation is having Single Main and Transfer Bus Arrangement. The new 132kV Tezu Line-2 Bay under present scope is envisaged adjacent to existing 132kV Tezu Line-1 Bay.

(I) Design, engineering, manufacture, testing, supply to site, including transportation & insurance, unloading, storage, erection, testing, and commissioning of the following equipment/items complete in all respects:

(a) **132kV Voltage Class AIS Equipments (As per BPS):** Circuit breakers, Isolators, Current transformers, Surge arresters, Capacitor voltage transformers, Bus post Insulators.

(b) **Control, Relay & Protection System (As per BPS):** Complete Control, Relay & Protection system for bays under present scope as per Section - Control & Relay Panels. Bidder shall be required to match Control & Relay panel with the existing panel.

Presently, there is no bus bar protection for 132kV bays at Tezu S/s. Under present scope new Busbar Protection (low impedance type) for 132kV bays as per SLD (Existing bays, present bays and future bays) is envisaged. Both low impendence type Centralized or distributed busbar protection scheme is acceptable. However, for centralized Bus Bar Protection scheme, separate LBB protection relay for bay under present scope shall be provided.

(c) **SAS Augmentation for bays under present scope:** Augmentation of Substation Automation System for bays as per BPS (bay as defined in technical specification, Section- Substation Automation System):
132kV Line Bay – 01 no.

- Existing 132kV Substation is equipped with M/s Schneider make substation automation system (SAS) based on IEC-61850 and the same is under upgradation through the OEM. Under present scope Bidder shall include BCUs required for 132kV bay mentioned above, including all necessary hardware & software to integrate IEDs offered under the present scope with installed Substation Automation System (SAS).

- The scope of the bidder shall include, but not limited to, integration of the IEDs under the present scope of works with existing substation automation (which is based on IEC-61850) and capability enhancement of same as required including updating of system database, display, development of additional displays and reports as per requirement. Any upgradation of hardware and software for above integration shall be in the scope of contractor including license fee (if any).

  Necessary configuration of data at Gateway for remote operation from NTAMC, Backup NTAMC, RTAMC & supervision from NERLDC (RSCC)/NLDC is included in present scope. However, no work is envisaged at remote end (RLDC/NLDC/NTAMC/RTAMC etc.) under the present scope.

(d) **Main Earthmat (As per BPS):** Main Earthmat in the switchyard area is already existing and the same needs to be extended under present scope. The existing **earthmat drawing is enclosed** in the tender drawings. Main earthmat shall be paid separately, as per actual laid quantity.

All the equipments, all Gantry support structures, equipment's structures, cable trenches, auxiliary earth mat for isolators/Earth Switches etc. shall be earthed by connecting them to the main Earthmat & cost of the same is deemed to be included in the respective BPS items of Erection Hardware.

(e) **Illumination (As per BPS)**: LED based lighting and illumination for the switchyard area under present scope, shall be provided by the contractor.

(f) **1.1 kV grade Power & Control cables:** 1.1 kV grade Power & Control cables (and special cables, if any) along with complete accessories. Methodology for supply, installation & sizing of cables shall be as per Specific requirement. Methodology for supply, installation & sizing of cables shall be as per Specific Requirement at **Annexure-II**.

(g) **ACDC system**: Necessary AC/DC feeders are available at 132kV Namsai (PG) Substation. Bidders scope shall cover Supply, laying & termination of AC & DC cables as per requirement for the bays under present scope. Payment shall be regulated as per associated BPS items under 1.1 kV grade Power & Control cables.

(h) **Lattice structures (galvanized):** Fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of tower and equipment support structures including foundation bolts complete in all respect. Standard Equipment support structures except CB support structure, shall be provided as per Employer's drawings. CB support structure shall be as per CB manufacturer's design. Proto-corrected drawings and Bill of Materials of all structures like towers, beams, equipment support structures etc. shall be in the scope of the Contractor.

All non-standard structures shall be designed by the contractor considering wind speed as per NBCC 2016 and put-up for approval of the Employer during detailed engineering.

(i) **Erection Hardware (As per BPS) :** The erection hardware which include Insulator strings and hardware, clamps & connectors including equipment connectors, spacers, Aluminum tube, conductor, Bus bar materials, earthing materials, risers, auxiliary earthmat (excluding main earthmat), Earth wire, Bay marshalling box, cable supporting angles/channels, Cable trays and covers, Junction box, buried cable trenches, PVC pipes for cabling of equipment & lighting, Cable sealing arrangement, and all accessories etc. as per requirement.

The lightning protection (DSLP) for the switchyard area under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the existing structure and the structures being provided under present scope and earth wire. All associated hardware are to be regulated as per associated BPS items under "Erection H/W-132kV SMT Line Bay".

(j) **132kV Bus Works:**132kV Main Bus and Transfer Bus Extension for 03no. 132kV Bays (one present and two future bays), is envisaged under present scope as indicated in the tender drawings.

(k) Any other equipment/material required for completing the specified scope, shall be included in the scope of supply and the offer should be complete & comprehensive.

(l) **TELE-COMMUNICATION EQUIPMENT**

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 following:

i. SDH Equipment along with suitable interfaces and line cards.
ii. All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
iii. System integration of all supplied subsystem
iv. Integration with the existing communication system based on SDH and PDH of employer
v. Integration of supplied subsystem with SCADA system, PLCC equipment, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
vi. Fibre Optic Approach Cable (FOAC) along with Duct, GI PIPE, GI Elbow, GI FLEXIBLE CONDUIT and Fibre Optic Distribution Panel (FODP)
vii. Integration of new Communication equipment in the existing regional NMS. All required support to existing NMS vendor for integration of new Communication equipment.

(II) Design, engineering, manufacture, testing, supply including transportation, insurance & storage & testing at site of **Mandatory spare**s as per **Bid Price Schedule (BPS)**.

(III) **Civil works -** The scope of work shall include but not be limited to the following: -

i) The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report.

ii) 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, anti-weed treatment and 75mm thick PCC (1:5:10) in the switchyard. A layout for the same shall be developed by the contractor & shall be submitted to the employer for approval.

b) Removal, cleaning and washing of existing stone and re-spreading after doing anti-weed as per Section-Civil Works is in the scope of contractor wherever stone is laid in the area under present scope.

c) Cable trenches including cable trenches in Transformer area along with covers including road/rail crossing, sump pits, culverts etc. The cable trench layout including invert levels shall be developed by the contractor.

d) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.

e) Preparation of storm water drainage layout using POWERGRID standard sections.

f) All roads as per the layout. The road layout shall be developed by the contractor.

g) The design & execution of retaining wall shall be in the scope of contractor and the same shall be paid under items such as excavation, PCC, RCC, reinforcement steel, etc. shall be measured and paid under respective items of BPS.

h) Buried cable trench for HT cables (as per BPS).

i) Dismantling of existing switchyard fence.

j) Any other item/design/drawing for completion of scope of works.

iii) The scope of civil work shall include but shall not be limited to the following based on **drawings developed by POWERGRID:**

a) Structure and foundation for all standard gantry structures & equipment support structures.

b) Cable trenches, Road, Drains- The sections details of cable trench, road, road crossings, drains etc. shall be provided by Employer. However, cable trench layout, road & drain layout including invert levels shall be developed by the contractor and be approved by Employer.

c) Switchyard fencing as per Employer drawings complete in all respect.

2.2.5 Installation of new 1x50MVA, 132/33kV ICT at Namsai (POWERGRID) S/s along with associated bays.

AIS Substation Extension

S. No.	Description
1.	**Extension of 132kV Namsai S/s (POWERGRID):** **132kV** • 132kV ICT bay : 1 no. for installation of 132KV, 1x50MVA ICT • 33 kV ICT Bay: 01 no. • 132/33kV 1X50 MVA ICT: 01 no

The detailed scope of work for Extension of 132kV Namsai Substation(POWERGRID) is brought out in subsequent clauses of this section.

A. Transformer:

Supply, erection, testing and commissioning of 132/33kV, 1x50MVA, 3Ph, ICT is covered under this package. Following associated works are covered under the scope of this package**:**

i. Associated Civil works for 132/33kV, 1x50MVA, 3Ph, ICT, foundation bolts, connection arrangement, earthing connection to main earthmat, etc. as per technical specification.
ii. HVWS & Hydrant Protection of 132/33kV, 1x50MVA, 3Ph, ICT.
iii. Overhead connection of HV & LV bushings of 132/33kV Autotransformers to substation equipment.
iv. Supply, laying and termination of cables along with associated accessories from Marshaling box of 132/33kV, 1x50MVA Autotransformers to BMK/Relay Room/control room of 132kV Namsai S/S as per requirement.

B. Air insulated switchgear (AIS) and Other Main Equipment

Design, engineering, manufacture, testing at manufacturer's works, supply including transportation and insurance, unloading, storage, erection, testing and commissioning at site the following equipment/items, complete in all respects:

(i). 145kV Circuit Breakers, Isolators, Current Transformers, Bus Post Insulators and 120kV Surge Arresters.

(ii) 36kV Indoor switchgear panel along with bus sectionalizer, surge arrestor, BPI

(iii). Complete relay and protection system as per section– Complete Control, Relay & Protection system for bays under present scope as per Section - Control & Relay Panels. Bidder shall be required to match Control & Relay panel with the existing panel.

a) **132kV Bus bar protection scheme:** Presently, there is no Busbar protection at 132kV Namsai substation. Bus Bar protection has been considered under NERES XXIII package pertaining to 132kV bay extension as mentioned above. Main bus bar shall be supplied under that package.

However, augmentation of bus bar under the present scope shall be under the scope of contractor.

(iv) SAS Augmentation for bays under present scope: Augmentation of Substation Automation System for bays as per BPS (bay as defined in technical specification, Section- Substation Automation System):

- Existing 132kV Substation is equipped with M/s Schneider make substation automation system (SAS) based on IEC-61850 and the same is under upgradation through the OEM. Under present scope Bidder shall include BCUs required for bay mentioned above, including all necessary hardware & software to integrate IEDs offered under the present scope with installed Substation Automation System (SAS).

- The scope of the bidder shall include, but not limited to, integration of the IEDs under the present scope of works with existing substation automation (which is based on IEC-61850) and capability enhancement of same as required including updating of system database, display, development of additional displays and reports as per requirement. Any upgradation of hardware and software for above integration shall be in the scope of contractor including license fee (if any).

  Necessary configuration of data at Gateway for remote operation from NTAMC, Backup NTAMC, RTAMC & supervision from NERLDC (RSCC)/NLDC is included in present scope. However, no work is envisaged at remote end (RLDC/NLDC/NTAMC/RTAMC etc.) under the present scope.

C. Fire Protection System:

- Fire protection system including HVWS & Hydrant system for supplied 132KV, 1x50 MVA, 3-ph Transformers.

D. Air Conditioning System:

- Not required

E. LT Switchgear:

LT Switchgear distribution boards to be supplied under the subject package shall generally be designed (Bus Bar rating, Short-Circuit rating, Bus Section design, Incomer Feeder design, Protection Scheme, etc.) as per TS. Further, details of outgoing feeders for each board shall be as per Table below :

48V DCDB	Incomer Feeder (100Amp, 2P MCCB)	1 Nos.
	Outgoing Feeders (100Amp, 2P MCCB)	3 Nos.
	Outgoing Feeders (32Amp, 2P MCB)	8 Nos.

Aforesaid LT Panels shall be located at existing battery room. At present only one 48V DCDB is existing which is being fed from 2 battery and 2 battery chargers. Additional 48V DCDB is envisaged under the present scope along with modification in connection from one battery and battery charges as required at site.

F. 1.1 kV grade Power & Control cables and special cables, if any, along with complete accessories. For type of 1.1kV Power & Control cables & its sizing Annexure-S1 of specific requirement Rev 10 shall be referred.

G. Illumination System: LED based Outdoor Illumination & Outdoor Receptacle (As per BPS). Illumination system shall be provided using the fixture types as specified in Technical Specification Section-Lighting System.

H. Erection Hardware: Insulator strings hardware, Disc Insulators/Long Rod Insulators (as applicable),Conductor(s), Al tube, bus-bar materials, cable trays & covers, Bay MB, spacers, clamps & connectors, junction box, earthwire, earthing material risers, auxiliary earthmat (excluding main earth mat), buried cable trenches/pipes for equipment & lighting, cable supporting angles/channels, insulating mats, cable sealing arrangement, all accessories etc. as required.

Erection Hardware of a bay shall also include Earthing Materials and Clamps & Connectors for Employer supplied equipment (specified above) for that bay.

J. Galvanized Lattice and Pipe structures (galvanized): Towers, Beams and all equipment support structures except support structure for circuit breaker. The Support structure for Circuit Breaker shall be as per manufacturer's design. Contractor shall provide editable soft copies of design & drawings during detailed engineering.

Proto-corrected drawings and Bill of Materials of all structures like towers, beams, equipment support structures etc. shall be in the scope of Contractor. Approved proto corrected drawing alongwith BOM shall be submitted by contractor as final copies for information only.

I. Earthmat:

Existing main earthmat shall be extended by the contractor for the area under present scope of work & shall be payable as per actual length laid under BPS item "40 mm MS rod for Main Earthmat". Grid Spacing of existing earthmat shall be provided to successful bidder during detailed engineering.

All the Gantry support structures, Equipment's support structures, cable trenches, etc (under present scope), shall be earthed by connecting them to the main Earthmat & shall be considered as part of Erection Hardware.

J. Lightning protection (DSLP): The lightning protection (DSLP) for bays under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the structures being provided under present scope.

The civil works shall be payable as per relevant item of BPS.

K. Any other equipment/material required to complete the specified scope.

L. Civil works

1. The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report.

2. The scope of civil work shall include but shall not be limited to the following based on drawings developed by POWERGRID.

    a) Structure and foundation for all tower, beam, and all equipment support structures.
    b) Stone Packing (if required) beneath foundations etc. coming up on filled up earth.
    c) Cable trenches, road, drains- The sectional details of cable trench, road, road crossings, drains etc. shall be provided by POWERGRID. However, cable trench layout, road layout & drain layout including invert levels shall be developed by the contractor.
    d) Switchyard fencing and switchyard gate.

e) Foundation of Transformers including rail cum road, unloading platform, jacking pad, Oil pit/ common oil pit, pulling block, gratings etc. as per technical specification.
f) Firewalls for Transformers
g) Any other item/design/drawing for completion of scope of works

2.3 **Transmission line side insulator string for 132kV Line termination and tension clamp (if required) for earth wire termination shall be in the scope of the contractor.**

2.4 Shield wire, spike wherever required to achieve DSLP protection of bays under present scope are included in the contract scope.

2.5 The work to be done under this specification shall include all labour, plant, equipment, material, and performance of all work necessary for the complete installation and commissioning of the 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.

2.6 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 endeavor 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.

2.7 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 shall be supplied by the Contractor. Complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor.

2.8 The Contractor shall also be responsible for the overall co-ordination with internal/external agencies, project management, loading, unloading, handling, moving to destination for successful erection, testing, and commissioning of the substation/switchyard.

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 Any other items not specifically mentioned in the specification, but which are required for erection, testing and commissioning and satisfactory operation of the substation are deemed to be included in the scope of the specification unless specifically excluded.

2.11 Employer has standardized its technical specification for various equipment 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.

3.0 SPECIFIC EXCLUSIONS

The following items of work are specifically excluded from the scope of the specification:

(a) Employer's site office and stores.
(b) Approach Road up to the substation boundary wall
(c) Modification of data base at SLDC/NERLDC.

4.0 PHYSICAL AND OTHER PARAMETERS

Location and Meteorological data are as below:

Station Name	132kV Pasighat (PG) S/s (Extn)	132kV Roing (PG) S/s (Extn)	132kV Tezu (PG) S/s (Extn)	132kV Namsai (PG) S/s (Extn)
Altitude (Above M.S.L.)	Less than 1000m	Less than 1000m	Less than 1000m	Less than 1000m
Snow fall	NIL	NIL	NIL	NIL
Seismic Zone	NBC 2016	NBC 2016	NBC 2016	NBC 2016
Wind Zone	NBC 2016	NBC 2016	NBC 2016	NBC 2016
Min./Max. Ambient Temperature	0 / 50 degree centigrade	0 / 50 degree centigrade	0 / 50 degree centigrade	0 / 50 degree centigrade
Coastal Area consideration	No	No	No	No
Nearest Rail Head	North Lakhimpur	Tinsukia	Tinsukia	Tinsukia
State	Arunachal Pradesh	Arunachal Pradesh	Arunachal Pradesh	Arunachal Pradesh

5.0 SCHEDULE OF QUANTITIES

The requirement of various items/equipment and civil works are indicated in Bid price Schedules (BPS).

All equipment/items and civil works for which bill of quantity has been indicated in BPS shall be payable on unit rate basis. During actual execution, any variation in such quantities shall be paid, based on the unit rate under each item incorporated in Letter of award.

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. For erection hardware items, Bidders shall estimate the total requirement of the works and indicate module-wise (bay wise) lump sum price and include the same in relevant Bid price schedules. For module identification, Bidder may refer typical drawings enclosed with the specifications. Any material/works for the modules not specifically mentioned in the description in BPS, as may be required shall be deemed to be included in the module itself.

No cost compensation shall be considered on account of "Set/LOT/LS" items in any case of number of bays specified in section 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 and transformer shall be included in the bid price and shall be provided at no extra cost to purchaser.

6.0 BASIC REFERENCE DRAWINGS

6.1 The substation equipments shall be designed considering current ratings as indicated below:

S. No.	Description of bay	Pasighat (PG) S/s (Extn)	Roing (PG) S/s (Extn)	Tezu (PG) S/s (Extn)	Namsai (PG) S/s (Extn)
		132kV	**132kV**	**132kV**	**132kV**
1.	Main Bus	Twin ACSR Zebra	Twin ACSR Zebra	Twin ACSR Zebra	Twin ACSR Moose
2.	Transfer Bus	Single ACSR Zebra	Single ACSR Zebra	Single ACSR Zebra	Single ACSR Moose
3.	Line bay / Reactor Bay	1250A	1250A	1250A	1250A

6.1 Single line diagram and Layout drawing for substations are enclosed with the bid documents as per **Annexure-I** for reference, which shall be further engineered by the bidder.

It is the responsibility of contractor to develop general arrangement drawing, layout drawings, single line drawing, foundation & cable trench layout, erection key diagram & all other layout drawings for present scope of work

6.2 The reference drawings, which form a part of the specifications, are given at **Annexure-I**. 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 in consultation with Employer to obtain the statutory electrical clearances required for the substation.

6.3 The enclosed drawings give the basic scheme, layout of substation, associated services etc. In case of any discrepancy between the drawings and text of specification, the requirements of text shall prevail in general. However, the Bidder is advised to get these clarified from Employer.

7.0 DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

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

1.	Section: Project	Rev-00
2.	Section : TRANSFORMER (UPTO 400 KV CLASS)	Rev-13
3.	Section: General technical Requirement (GTR)	Rev-15
4.	Section: Switchgear-CB	Rev-11
5.	Section: Switchgear - Isolator	Rev-13
6.	Section: Switchgear-Instrument Transformer	Rev-12
7.	Section: Switchgear – Surge Arrestor	Rev-13
8.	Section: Power & Control Cable	Rev-06
9.	Section: Lighting System	Rev-07
10.	Section: Switchyard Erection	Rev-10
11.	Section: Structure	Rev-07
12.	Section: Civil Works	Rev-12
13.	Section: Control & Relay Panel	Rev-09
14.	Section: Substation Automation System	Rev-04
15.	Section: Fire Protection	Rev-06
16.	Section: Air Conditioning System	Rev 04
17.	Section: PLCC	Rev-05
18.	Section: Telecommunication Systems	Rev 05
19.	Section: PMU	Rev 01

In case of any discrepancy between Section-PROJECT, Section-GTR and other technical specifications on scope of works, Section-PROJECT shall prevail over all other sections.

In case of any discrepancy between Section-GTR and individual sections for various equipment, requirement of individual equipment section shall prevail.

In case of any discrepancy between Main body of Section- PROJECT and Annexure(s) of Section-Project, provisions specified in Main body of Section- PROJECT shall prevail.

In case of any discrepancy between BPS and other sections, BPS shall prevail over the other sections of the technical specifications. However, for rating of the BPS items, associated Section-Project shall prevail & is to be referred to.

8.0 MANDATORY SPARES

Mandatory Spares shall be included in the bid proposal by the bidder. The prices of these spares shall be given by the Bidder in the relevant schedule of BPS.

The bidder is clarified that no mandatory spares shall be used during the commissioning of the equipment. Any spares required for commissioning purpose shall be arranged by the Contractor. The unutilized spares if any brought for commissioning purpose shall be taken back by the contractor.

Wherever spares in BPS/Technical Specification have been specified as "each type/each rating/each type & rating": If the offered spare/spares are sufficient to replace the respective main equipment of all types/ratings, then such offered spare/spares shall be acceptable. It implies that common spare/spare set fulfilling the spare requirement of all types/ratings shall also be acceptable, provided it is configurable at site itself without special assistance of OEM.

Mandatory Spares, wherever mentioned, are envisaged for the equipment/items being supplied under the main equipment heads under present scope meeting the requirements of Technical Specifications. The component/sub-component of an equipment/item specified in BPS under Mandatory Spare, which is not applicable as per the offered design of respective main equipment, shall not be referred to.

9.0 SPECIFIC REQUIREMENT

9.1 The specific requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no 08 enclosed at Annexure-II and relevant/applicable clauses shall be referred for specified scope of work. Any discrepancy between clause 9.0 Section-PROJECT and Annexure-II on scope of works, the requirement stipulated at clause 9.0 of section project shall prevail.

9.2 Clause no 41 (b) of Section- Section - Control & Relay Panel Rev 09 is modified as:

"POWERGRID has standardized binary input/output details, indication details, DR signals & texts, etc. of protection IEDs, SAS HMI Signal List, Protection Panels CT/VT circuit termination detail, Trip Logic etc. and the same shall be used by contractor during detail engineering for preparation of schematics. **Standardized documents are attached as Folder APPENDIX-C.** Panel nomenclature, terminal blocks identification, as applicable, shall be according to typical detail given at APPENDIX-B*"*

9.3 First Para under Clause no. 8.2 of Section- Substation Automation System Rev 04 is modified as:

*"*The supplier shall submit a test specification for factory acceptance test (FAT) and commissioning tests of the station automation system including Control Relay Protection

(CRP) for approval based on the standard SAS/CRP FAT procedure of POWERGRID. **The Standard SAS FAT format & procedure is provided at Appendix-II & the Standard CRP FAT format & procedure is provided at Appendix-III for reference guideline.** For the individual bay level IED's applicable type test certificates shall be submitted."

9.4 Clause no 1.3 of Section- Circuit Breaker Rev 11 is modified as

The circuit breaker shall be complete with operating mechanism, common marshalling box, piping, inter-pole cables, cable accessories like glands, terminal blocks, marking ferrules, lugs, pressure gauges, density monitors (with graduated scale), galvanized support structure, their foundation bolts and all other accessories required for carrying out all the functions of the CB.

9.5 Clause no 15.2 vii) of Section- Circuit Breaker Rev 11 is modified as

"For Low & High temperature type test, Field performance report of CB's as per IEC 62271-100 revision 2008 (covering amendment-2 in 2017) is also acceptable as valid Type test report."

9.6 Clause no 6.2.1 of Section- Lighting System Rev 07 is modified as

"6.2.1 CONSTRUCTIONAL FEATURES OF LIGHTING PANELS

ii) All Outdoor Lighting Panels shall be of **Sheet steel at least 2.0 mm thick cold rolled, or 2.5 mm hot rolled or alternately 1.5 mm thick stainless steel of Grade 304** and shall be dust, weather, and vermin proof. Panels shall be of smoothly finished, leveled and free from flaws. Stiffeners shall be provided wherever necessary."

9.7 Clause no 6.6. (i) (b) of Section- Lighting System Rev 07 is modified as

(i) *JUNCTION BOXES*

b) The outdoor junction boxes shall be complete with conduit knockouts/ threaded nuts and provided with terminal strips. The junction boxes shall be suitable for termination of Cable glands of required size. The junction boxes shall be provided with 4-way knockouts suitable for street lighting/switchyard lighting terminals suitable for 2 numbers 4C x 16 Sq.mm Al. cable or as per requirement.

All Outdoor Junction boxes shall be of **Sheet steel atleast 2.0 mm thick cold rolled or 2.5 mm hot rolled or alternately 1.5 mm thick stainless steel of Grade 304**. Outdoor Junction Boxes shall be suitable for mounting on columns, structures etc. for Outdoor Lighting. The outdoor Junction shall have IP 55 protection."

9.8 Clause nos. mentioned under Section-P of Specific requirement Rev 08 for Section: Civil Works Rev 11A – Deleted

9.9 Clause no mentioned under section D of Specific requirement Rev 08 for Section Switchgear-INST Rev 11- Deleted.

9.10 Clause nos. mentioned under Section-O of Specific requirement Rev 08 for Section: Structure Rev 06 – Deleted

9.11 Clause no mentioned under section E of Specific requirement Rev 08 for **Section Switchgear-ISOLATOR Rev 12**-Deleted.

9.12 Clause no mentioned under section F of Specific requirement Rev 08 for Section Switchgear-Surge Arrester Rev 12-Deleted.

9.13 Requirement Specified at clause no 29 of Section CRP Rev 9 for STANDALONE DISTURBANCE RECORDER (for 765 KV Feeders only) stands deleted.

9.14 "**Minimum specified creepage distance for insulator string/ long rod insulators/ outdoor bushings shall be 31 mm/kV**"