SECTION- PROJECT

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SECTION- PROJECT

1.0 GENERAL

1.1 Preamble:

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 the mission of "We will become a Global Transmission Company with Dominant Leadership in Emerging Power Markets with World Class Capabilities by:

a) World Class: Setting superior standards in capital project management and operations for the industry and ourselves.

b) Global: Leveraging capabilities to consistently generate maximum value for all stakeholders in India and in emerging and growing economies.

c) Inspiring, nurturing and empowering the next generation of professionals.

d) Achieving continuous improvements through innovation and state of the art technology.

e) Committing to highest standards in health, safety, security and environment.

1.2 POWERGRID is implementing following transmission schemes through Regulated tariff Mechanism (RTM) route:

a. Augmentation of transformation capacity at 400/220KV Nagarjunasagar substation in Andhra Pradesh by 1X500MVA, 400/220KV ICT(4th).

b. Conversion of 80MVAR fixed line reactor at Nellore end on Vijayawada- Nellore 400KV D/C line(line-2) to switchable line reactor.

1.3 The following elements are envisaged under *"*400/220KV Nagarjunasagar substation in Andhra Pradesh by 1X500MVA, 400/220KV ICT(4th).*"*:

A. Substations:

i) Extension of 400kV Nagarjunasagar (POWERGRID)Substation
ii) Extension of 220kV Nagarjunasagar (APTRANSCO)Substation

B. Shifting of Dead-end tower of 400kV Nagarjunasagar-Kadapa D/c line

Extension of 400kV Nagarjunasagar (POWERGRID)Substation and Extension of 220kV Nagarjunasagar (APTRANSCO)Substation is considered in present scope.

Shifting of Dead-end tower of 400kV Nagarjunasagar-Kadapa D/c line shall be covered under separate package.

1.4 The following elements are envisaged under *"*Conversion of 80MVAR fixed line reactor at Nellore end on Vijayawada- Nellore 400KV D/C line(line-2) to switchable line reactor*"*:

A. Substations:

i) Extension of 400kV Nellore (POWERGRID)Substation

1.5 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.

1.6 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.

1.7 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 contractor 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 for the substations is as follows:

S. No.	Scope
1.	**Augmentation of transformation capacity with 400/220kV, 1x500 MVA ICT**

	(4th) at Nagarjunasagar 400/220kV substation **Fault level for 400kV- 63kA for 1 sec** **220kV- 50kA for 1 sec** **Switching Scheme: 400kV- One and a Half Breaker (D-Type Layout)** **220kV-Double Main (APTRANSCO switchyard)** • 500 MVA, 400/220 kV ICT – 1 No. **(Supply, erection and testing and commissioning of 500MVA, 3Ph., 400/220/33kV Autotransformer is covered under separate package)** • Shifting of existing 125 MVAr, 420 kV Bus Reactor from existing Bay No. 404 to new Bay No. 409 - 1 No. • Installation of 4th ICT in existing 400kV bay No. 404 vacated after shifting of ICT • 220kV ICT bay- 1 No. • 220kV ICT Bay at 220kV APTRANSCO switchyard – 1 no. (Only isolators and CT)- Refer tender SLD • 400kV Reactor Bay No. 409 (feeder extension in existing half diameter) – 1 No. • Interconnection between POWERGRID 400/220 kV switchyard and APTRANSCO 220 kV switchyard • Extension of 220 kV Bus Bar of APTRANSCO for accommodation of 3 Nos. 220 kV Bays (1 No. for 4th ICT and provision for future 2 Nos. line bays) Supply, erection and testing and commissioning 500MVA, 3Ph., 400/220/33kV Autotransformer is covered under separate package. However, the following works pertaining to employer supplied 400/220/33kV auto transformer are envisaged as per details specified below: a) Civil works for Autotransformers, foundation bolts, earthing etc. as per technical specification. b) Protection system, clamps and connectors, connection with switchyard bay c) HVWS & Hydrant system for Autotransformer.
2.	**Conversion of 80MVAR fixed line reactor at Nellore end on Vijayawada- Nellore 400KV D/C line (line-2) to switchable line reactor along with NGR and its bypassing scheme** **Fault level for 400kV- 63kA for 1 sec** **Switching Scheme: 400kV- One and a Half Breaker** i) 400kV switchable reactor bay (Conversion from fixed to switchable)- 1 No. ii) NGR along with bypassing scheme – 1No. **Note: -** Works for conversion of existing 50MVAR line reactor into 80MVAR line reactor will be carried out (Dismantling of existing 50MVAR line reactor,

	foundation modification works, Installation of new 80 MVAR line reactor of **M/s CGL make,** including HVWS system) under a different package.

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

2.2 Extension of 400/220KV NAGARJUNASAGAR S/S:

2.2.1 Design, engineering, manufacture, testing, supply including transportation & insurance, unloading, storage, erection, testing and commissioning at site of following equipment and items complete in all respect:

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

i. **400kV and 220kV VOLTAGE CLASS AIS EQUIPMENT (As per BPS):** 400kV and 220kV Circuit Breakers, Isolators, Current Transformers, Bus Post Insulators & Surge Arrester as per BPS.

ii. Controlled Switching device (as per BPS) for existing bay 408 and new bay 409. Make of circuit breaker for existing CB at bay no. 408 is M/s CGL. Existing CSD at bay no. 404 and 405 shall be reconfigured for switching of 400/220/33kV ICT.

iii. Dismantling, shifting and re-erection of 125MVAR Shunt reactors: Dismantling, shifting, & re-erection of 1 nos. 420 kV Shunt Reactors, 125MVAR (M/s CGL make) from bay no. 404 to 409 bay in the same substation. The contractor shall also arrange the services of OEM representative **(M/s CGL)** for dismantling and re-erection of the Bus Reactors. Present scope 400/220/33kV ICT shall be installed in the vacated 404 bay.

iv. **CONTROL, RELAY & PROTECTION SYSTEM:** Complete control, relay and protection system as per Section–Control and Relay panels

a. The Augmentation of 400kV Busbar protection scheme (duplicate) as per following:

Existing Busbar protection scheme: Decentralized

Make: M/s GE make

Model: P741-PU and P743-CU.

Architecture: Decentralized architecture.

PU Available: Yes. For 404 bay PUs is already available. For 409 bay, PU is available and wired to 408 bay as per scheme requirement of Half diameter.

All required Trip Relays, wiring, modification etc. as per requirement for augmentation of bus bar for 2 nos. main bays is under present scope. No supply item is envisaged for 400kV busbar protection augmentation. In case any minor

item is required for the augmentation of 400kV bus bar protection, same shall be deemed to be included in service item of same.

b. The Augmentation of 220kV Busbar protection scheme (APTRANCO) is included in the present scope as per following:

   Existing Busbar protection scheme: Decentralized

   Make: M/s GE make

   Model: P741-PU and P742-CU.

   Architecture: Decentralized

   architecture. PU Available: No.

   Supply of PU for 220kV ICT bay is included under present scope. All required Trip Relays, wiring, modification etc. as per requirement for augmentation of bus bar for 1 nos. 220kV bay is under present scope.

c. Control panel for Dia 404-405-406 is existing with bay no. 404 configured for 420kV Bus Reactor. Under present scope, control panel shall be modified to include control for HV and IV side of 400/220/33kV ICT in place of bus reactor. Control panel for dia. 407-408-409 is existing with bay no. 409 as future bay. Under present scope the control panel shall be modified for 420kV Bus Reactor Bay. The augmentation and modification of control panel shall be done under item "400KV CONTROL PANEL AUGMENTATION" of BPS. The augmentation of control panel includes changing of mimic, supply of new digital ammeter, wattmeter with transducer, Varmeter with transducer.

d. New Control panel for control and monitoring of 220kV Isolators for Transformer Bay at APTRANSCO switchyard shall be provided under present scope.

e. Existing Protection panel of 420kV, 125MVAr Bus Reactor is placed in control room building and wired to bay equipment as per its existing location at 404 bay. Under present scope, scheme modification, wiring to bay equipment as per scheme requirement etc. for new location at bay no. 409 shall be done.

f. Protection panels for HV and IV ICT bay for 400/220/33kV Transformer Bay under present scope shall be placed in new SPR. Required cabling modification in existing control and protection panel is also included under present scope and shall be payable under item for cable in BPS.

g. Nagarjunasagar S/s is non-automated, control panel-based substation with RTU based system for remote operation from NTAMC. **Circuit Breaker relay panel for 400kV bay and 220 kV Bay for 400/220/33kV ICT shall be provided with 1 no. BCU each**. The IEDs being supplied under present scope shall be integrated with NTAMC Gateway as per technical specification for NTAMC SCADA system enclosed at ANNEXURE-IV. No work is envisaged at remote control centre.

h. M/s GE make D400 RTU is existing at Nagarjunasagar S/s for data transfer to RLDC. Under present scope, existing RTU shall be augmented for data transfer to RLDC for present scope bays. As sufficient input cards are not available in the RTU for present scope bays, 1no. Digital input card & 1no. Analog input card

is to be provided. However necessary transducers for augmentation of analog signals shall be provided under present scope.

v. **Complete Fire Protection System**

a. Fire protection system including HVWS & Hydrant system for 400/220/33kV, 3-Phase Autotransformer. The piping for fire protection system shall be extended from nearest available header. Further, Dismantling, shifting & re- erection of existing HVWS system for 420kV, 125MVAR Bus Reactor including supply of additional pipes, accessories etc. as required is also included under present scope. Any new item required or those damaged or rendered useless during relocation shall also be included in present scope. No supply item for is envisaged for HVWS shifting works. In case any minor item is required for the same, it shall be deemed to be included in service item for shifting of HVWS system.

b. Conventional type Smoke detection, Fire Extinguishers and augmentation of Fire alarm & Annunciation System for Switchyard panel Rooms under the present scope.

vi. **AIR CONDITIONING:** Air Conditioning System for Switchyard panel rooms.

vii. **CABLES**: 1.1 kV grade Power & Control Cables (and special cables, if any) along with complete accessories including cables for oil filtration units and cabling from common marshaling box of 400kV Transformers to bay kiosks/ Relay Panel Room / Control Room. Power receptacle for oil filtration unit shall also be provided under present scope of work. Methodology for supply, installation & sizing of cables shall be as per Annexure-S1 of Specific requirement, Rev 10 enclosed at Annexure-II.

viii. **VISUAL MONITORING SYSTEM** for watch and ward of substation premises.

Specification as described at Specific Requirement REV-10 to be referred to.

Visual Monitoring System (VMS) for area under present scope. Make of existing VMS software is Nice vision. The provided system has to be integrated with existing Video Monitoring software. The bidder shall provide 4 nos. IP camera with PAN, Tilt & Zoom facility suitably located in Outdoor switchyard in the present scope area. The scope of bidder shall include providing all Items, Accessories, Line Interface units, Fiber patch cords, Power supply units, Junction Boxes, Cables, Fiber Optic Cables, Hardware and Software, etc. as are applicable to the product design, to meet functional requirements. Compatibility and capability enhancement of exiting VMS system, if needed, shall be done to integrate present scope visual monitoring system with existing Visual monitoring system of the station.

ix. **ILLUMINATION SYSTEM:** LED based Lighting and illumination system for the switchyard area under present scope and Switchyard panel room. Illumination system shall

be provided using the fixture types as specified in Technical Specification Section-Lighting System.

x. **ERECTION HARDWARE**: Erection hardware of a bay shall include Insulator strings and hardware, Disc Insulators/Long Rod Insulators (as applicable), Conductor(s), Al tube, Cable Trays & covers, spacers, clamps & connectors (including terminal connectors for 400/220/33kV transformer bushings), Junction box, earthwire, earthing material risers, auxiliary earthmat (excluding main earth mat), buried cable trenches/pipes for equipment & lighting, cable supporting angles/channels Cable pull pit, cable trays & covers, Insulating mats, cable sealing arrangement, , all accessories etc. as required.

- **Erection Hardware under respective BPS Item shall also cover the following:**
  a) Earthing of all the equipments including cable trenches, auxiliary earthmat for isolators etc., & scope shall include Earthing of employer-supplied Transformer by connecting them to the main Earthmat.
  b) Jackbus for future 2 nos. 220kV Line bays shall be provided under present scope as per GA drawing.

xi. **MAIN EARTHMAT:** Main Earthmat shall be paid as per actual length executed at site. The main earthmat is existing in some areas under present scope. In areas under present scope, where main earthmat is not available, it shall be laid under present scope All the equipment (including owner supplied 400/220kV Transformers), structures, cable trenches, etc. to be earthed by risers connecting them to the Main Earthmat and the same shall be part of Erection Hardware.

xii. **LIGHTNING PROTECTION (DSLP):** The lightning protection (DSLP) for area under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the structures provided under present scope.

If the existing structures are not adequate for Lightning Protection, then LM shall be provided. LM shall be paid under MT rate quoted for steel structure in BPS. Earthing of LM shall be done by the contractor and same shall be deemed to be part of erection hardware for the bay.

xiii. **LT SWITCHGEAR:**

415V ACDB (Extn.)- As per BPS includes:

- Existing ACDB-I & II shall be augmented under present scope by providing 8 sets of 63A, 4P MCCB, 4 set of 32A, 4P MCCB, 2 set of 100A, 4P MCCB and 1 set of incomer MCCB, 4P 300A along with required TB's and wiring on each ACDB. The MCCBs under present scope shall be provided in separate extension board (1 each for ACDB I & II). Further, 1 no. outgoing 300A 4P, MCCB on each existing ACDB, shall be provided. The separate extension board shall be integrated with existing ACDB and shall be kept adjacent to existing ACDB.

220kV DCDB (Extn.)- As per BPS includes:

- Existing DCDB-I & II shall be augmented for bays under present scope by providing 8 sets of 32 A, DP MCB, along with required TB's and wiring on each DCDB. The MCB under present scope shall be provided in the vacant slot in the existing DCDB**.**

xiv. **LATTICE AND PIPE STRUCTURES (GALVANIZED):**

- In the bid price schedule Tower, Beam and equipment support structures are indicated in Metric Ton (MT) and shall be paid as per respective items of BPS. 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.
- The support structure for Circuit Breaker shall be as per manufacturer's design & shall be deemed to be included in the cost of respective CB.
- The fabrication drawings of towers and beams shall be provided by Employer during detailed engineering. In case POWERGRID provides the Single Line Diagram (SLD) of the structures, contractor shall prepare the fabrication drawing based on the SLD and submit for approval. However, POWERGRID may ask the Contractor to prepare the design and drawings of structures. In such case, Contractor shall prepare design and drawings and put up for Employer's approval. The design shall be payable as per relevant item of BPS.
- Design and drawings of items (if any) not covered above shall be prepared and put up for approval by the Contractor 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.
- The proto corrected drawings along with BOM are to be witnessed and certified by the contractor. Certified proto corrected drawings along with BOM shall be submitted to POWERGRID for information only. Contractor shall provide editable soft copies of drawings (including Proto-corrected Shop-floor DWG in AUTOCAD) & BOMs during detailed engineering.

2.2.2 Civil Works

1. The design of 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. 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).

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. Structure and foundation for all tower, beam and all equipment support structures (except for the equipment support structure for 33 kV NCT and other equipment support structure used for Neutral and Tertiary formation for Transformers and Neutral formation for Reactors).
f. Foundation of Reactors including rail cum road, unloading platform, jacking pad, Oil pit/ common oil pit, pulling block, gratings etc. as per technical specification.
g. Foundation of Transformers including rail cum road, unloading platform, jacking pad, Oil pit/ common oil pit, pulling block, gratings etc. as per technical specification.
h. Switchyard Panel Room.

3. The scope of civil work shall include but shall not be limited to the following based on drawings developed by the **CONTRACTOR**:
   a. Structure and foundation for the equipment support structure for 33 kV NCT and other equipment support structure used for Neutral and Tertiary formation for Transformers and Neutral formation for Reactors.
   b. Stone spreading and anti-weed treatment in the switchyard. A layout for the same shall be developed by the contractor.
   c. Providing & laying of non-woven Geo-synthetics fabric of minimum 200 GSM in separation layer between sub garde and stone spreading in switchyard.
   d. Switchyard drains and peripheral drains (along the plot boundary). Preparation of storm water drainage layout using POWERGRID standard sections.
   e. Slope Protection Works: Sectional details of drystone pitching/ RCC retaining wall etc. and slope protection layout drawing shall be prepared by the contractor.
   f. Dismantling of existing structure (Deluge Valve, water tank etc.) if required.
   g. Dismantling & re-erection of existing Boundary wall.
   h. Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.
   i. Any other item/design/drawing for completion of scope of works

2.3 Extension of 400KV Nellore S/s:

2.3.1 Design, engineering, manufacture, testing, supply including transportation & insurance, unloading, storage, erection, testing and commissioning at site of following equipment and items complete in all respect:

A. <u>Air insulated switchgear (AIS) and Other Main Equipment</u>

i. **400kV VOLTAGE CLASS AIS EQUIPMENT (As per BPS):** 400kV Circuit Breakers as per BPS.

ii. **145kV VOLTAGE CLASS AIS EQUIPMENT (As per BPS):** 145kV Circuit Breakers and BPIs as per BPS

iii. 145kV Oil filled NGR of rating **300 Ohm** with insulating oil,

iv. Controlled Switching device (as per BPS).

v. The Line reactor bay at Nellore end of Vijayawada- Nellore 400KV D/C line(line-2) shall be provided with new 400kV Circuit breaker for switching of the line reactor. 400kV BPI (along with support structure) shall be dismantled and handed over to POWERGRID site incharge. The vacated space after dismantling of BPI shall be used for erection of 400kV Circuit Breaker.

vi. **CONTROL, RELAY & PROTECTION SYSTEM:** Complete control, relay and protection system as per Section–Control and Relay panels

a. Existing Control panel for the Line with line reactor bay shall be modified to include control and monitoring of 400kV and 145kV CB and 145kV NGR under present scope.

New CB relay panel shall be provided for 400kV CB under present scope. Same shall be augmented to existing reactor protection panel as per scheme requirement. Further scheme for NGR bypassing in case of single phasing of line reactors shall be implemented in the existing protection pane. No supply item is envisaged for modification of Existing control panel and modification of existing relay panel. In case any minor item is required for the augmentation of 400kV bus bar protection, same shall be deemed to be included in service item of same.

b. At present all the signals as per NTAMC standard list are wired to RTU and further this RTU is reporting to gateway in 101 protocol. Subsequently these signals are reporting to NTAMC/RTAMC through BCU gate way and other communication equipment. It shall be the responsibility of the contractor to successfully integrate the all the signals as per standard list and protection IEDs with existing substation automation system including updating of system database, displays, and development of additional displays and reports as per requirement for the bays covered under present scope.

c. M/s GE make D400 RTU is existing at for data transfer to RLDC. Under present scope, existing RTU shall be augmented for data transfer to RLDC for present

scope bays. Sufficient input cards are available in the RTU for present scope bays.

vii. **Complete Fire Protection System**

HVWS for NGR to be included in the conversion of existing 50MVAR line reactor into 80MVAR line reactor will be carried out (Dismantling of existing 50MVAR line reactor, foundation modification works, Installation of new 80 MVAR line reactor of **M/s CGL make,** including HVWS system) under a different package.

viii. **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 Annexure-S1 of Specific requirement, Rev 10 enclosed at Annexure-II.

ix. **ERECTION HARDWARE**: Erection hardware of a bay shall include Insulator strings and hardware, Disc Insulators/Long Rod Insulators (as applicable), Conductor(s), Al tube, Cable Trays & covers, spacers, clamps & connectors (including terminal connectors for 400/220/33kV transformer bushings), Junction box, earthwire, earthing material risers, auxiliary earthmat (excluding main earth mat), buried cable trenches/pipes for equipment & lighting, cable supporting angles/channels Cable pull pit, cable trays & covers, Insulating mats, cable sealing arrangement, , all accessories etc. as required.

x. **LATTICE AND PIPE STRUCTURES (GALVANIZED):**

- In the bid price schedule Tower, Beam and equipment support structures are indicated in Metric Ton (MT) and shall be paid as per respective items of BPS. 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.
- The support structure for Circuit Breaker shall be as per manufacturer's design & shall be deemed to be included in the cost of respective CB.
- The fabrication drawings of towers and beams shall be provided by Employer during detailed engineering. In case POWERGRID provides the Single Line Diagram (SLD) of the structures, contractor shall prepare the fabrication drawing based on the SLD and submit for approval. However, POWERGRID may ask the Contractor to prepare the design and drawings of structures. In such case, Contractor shall prepare design and drawings and put up for Employer's approval. The design shall be payable as per relevant item of BPS.
- Design and drawings of items (if any) not covered above shall be prepared and put up for approval by the Contractor 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.

- The proto corrected drawings along with BOM are to be witnessed and certified by the contractor. Certified proto corrected drawings along with BOM shall be submitted to POWERGRID for information only. Contractor shall provide editable soft copies of drawings (including Proto-corrected Shop-floor DWG in AUTOCAD) & BOMs during detailed engineering.

2.3.2 Civil Works

1. The design of 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. Stone Packing (if required) beneath foundations etc. coming up on filled up earth.
   b. Cable trenches, the sectional details of cable trench shall be provided by POWERGRID. However, cable trench layout shall be developed by the contractor.
   c. Structure and foundation for all equipment support structures (except for the equipment support structure for 33 kV NCT and other equipment support structure used for Neutral and Tertiary formation for Transformers and Neutral formation for Reactors).
   d. NGR foundation.
   e. Circuit breaker foundation for NGR bypass arrangement.

3. The scope of civil work shall include but shall not be limited to the following based on drawings developed by the **CONTRACTOR**:
   a. Structure and foundation for the equipment support structure for 33 kV NCT and other equipment support structure used for Neutral and Tertiary formation for Transformers and Neutral formation for Reactors.
   b. Stone spreading and anti-weed treatment in the switchyard & removal and respreading of existing stones after cleansing. A layout for the same shall be developed by the contractor.
   c. Dismantling of existing structure if required.
   d. Foundation for lighting poles, bay marshalling boxes, panels and control cubicles of equipment's wherever required.
   e. Any other item/design/drawing for completion of scope of works

2.4 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.

2.5 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. The complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor based on conceptual tender drawings.

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

2.7 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.

2.8 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.

2.9 Employer has standardized its technical specification for various equipment's 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 specifications at all sub-stations:

3.1 400/220kV Nagarjunasagar S/s:

a) Employer's site office and stores.
b) Supply, erection, testing & commissioning of 500 MVA, 400/230/33kV three phase autotransformers.
c) Tariff Meters

3.2 400/220kV Nellore S/s:

a) Employer's site office and stores.
b) LT switchgear
c) Soil investigation.

4.0 PHYSICAL AND OTHER PARAMETERS

4.1 **Location of the Substation** – The location of substation is indicated below:

Sr. No	Name of Substation	Name of State	Nearest Rail Head
1.	400/220KV Nagarjunasagar SS	Andhra Pradesh	Macherla
2.	400KV Nellore SS	Andhra Pradesh	Nellore

4.2 **Meteorological data** - The meteorological data are as below:

Station Name	400/220KV Nagarjunasagar SS	400KV Nellore SS
Altitude	Less than 1000 meter above mean sea level (MSL)	
Snow fall	NIL	
Seismic Zone	As per IS 1893 (Part 1)	
Wind Zone	IS 875 Part 3	
Min./Max. Ambient Temp.	0 / 50 degree centigrade	
Coastal Area Consideration	**No**	**Yes**

5.0 SCHEDULE OF QUANTITIES

The requirement of various items/equipments and civil works are indicated in Bid price Schedules.

All equipments/items, Structures 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 paid based on the unit rate under each item incorporated in Letter of award.

Wherever the quantities of items/works are indicated in Set/LOT/LS, 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 lump sum price bay wise and include the same in relevant Bid price schedules. 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 if 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 shall be included in the bid price and shall be provided

at no extra cost to Employer.

6.0 BASIC REFERENCE DRAWINGS

a) The substation shall be designed considering current ratings as indicated below:

S. No.	Description of bay	400/220KV Nagarjunasagar SS	
		400kV	**220kV**
1.	Bus Bar	-	3000A
2.	ICT bay	3150A	1600A
3.	Jackbus for Line Bay	-	1600A

b) Plot plan and coordinates of substation land shall be provided to the successful bidder during detailed engineering.

c) 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 to obtain the statutory electrical clearances required for the substation.
The enclosed drawings give the basic scheme and 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.

d) It is 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.

7.0 DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

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.

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 02
2	Section-General Technical Requirement (GTR)	Rev 15
3	Section-Switchgear- CB	Rev 11
4	Section-Switchgear- ISO	Rev 13
5	Section-Switchgear- Instrument Transformer	Rev 12

6	Section-Switchgear- Surge Arrester	Rev 13
7	Section-Power and Control Cables	Rev 06
8	Section-Lighting System	Rev 07
9	Section-Fire Protection System	Rev 06
10	Section – LT Switchgear	Rev 05
11	Section-Air Conditioning System	Rev 04
12	Section-Switchyard Erection	Rev 10
13	Section- Structures	Rev 07
14	Section-Civil Works	Rev 12
15	Section-Control and Relay Panels	Rev 09
16	Section-Substation Automation System	Rev 04
17	Section-420KV Reactor (For NGR)	Rev 11

In case of any discrepancy between Section-PROJECT and 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

The prices of mandatory spares shall be given by the Bidder in the relevant schedule of BPS and shall be considered for evaluation of bid. It shall not be binding on the Employer to procure all of these mandatory spares. 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 has 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 Relevant/applicable clauses of Specific Requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 (attached as **Annexure-II**) shall also be referred for specified scope of work. Any discrepancy between clause 9.0 Section-PROJECT and Specific Requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 (attached at Annexure-II) on scope of works, the requirement stipulated at clause 9.0 of section project shall prevail.

9.2 Clause No. "New Annexure-13" of Sl. No. B.25 of Specific requirement, Rev no. 10 (attached as Annexure-II) stands deleted.

9.3 **Nellore Substation is situated in coastal area. Hence, all the specifications defined for coastal area in various sections of Technical Specifications shall be applicable.**