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 Govt. of Maharashtra has identified the execution of *Intra-State Transmission system for "Establishment of 765kV GIS Pune West (District-Pune) in the State of Maharashtra"* through Tariff Based Competitive Bidding (TBCB) route. POWERGRID has emerged as successful bidder for implementation of the above transmission scheme.

1.3 The following elements are envisaged under "*Intra-State Transmission system for "Establishment of 765kV GIS Pune West (District-Pune) in the State of Maharashtra"* through TBCB route:

A. Substations:

i) Establishment of 765/400 kV GIS Pune West Substation with 2x1500 MVA, 765/400kV ICTs along with 1x240 MVAr (765kV) Bus Reactor
ii) 02 Nos of 400kV GIS Line bays at 400kV GIS Hinjewadi Substation for termination of 400kV Pune West-Hinjewadi D/c Line

B. Transmission lines:

i) LILO on 765kV Pune-III to 765kV South Kalamb 765kV D/C Line at 765kV GIS Pune West
ii) 400kV GIS Pune West to 400kV GIS Hinjewadi 400kV D/C Line (Quad Moose-2100 MVA per circuit at nominal voltage)

This Specification covers

a. Establishment of 765kV GIS at 765/400kV Pune (West) S/s with 2x1500MVA,765/400/33kV ICTs (7x500MVA single phase ICTs including 1x500MVA spare ICT) and 1x240MVAR 765kV Bus Reactor (4 x 80 MVAR, including one spare unit).

However, following elements envisaged in transmission scheme are covered under separate packages:

a. Establishment of 400kV GIS at 765/400kV Pune (West) S/s & Extension of 400kV Hinjewadi GIS S/s.
b. Supply, erection, testing & Commissioning of 2x1500MVA,765/400 kV ICTs and 765 kV 1x240 MVAR Bus reactor at 765 kV Pune (West) GIS Substation.
c. Associated transmission Lines.

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

1.5 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 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.

1.6 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. 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. SCOPE OF WORK

2.1 The broad scope for Establishment of **765/400kV Pune (West) GIS** Substation is as following:

S. No.	Scope
1.	**765/400kV Pune (West) GIS S/S** **765kV GIS (Under Scope of 765kV GIS New Substation Package-SS198T):** • 765/400kV, 1500 MVA ICT: 2 Nos. (7x500MVA single phase ICTs including 1x500MVA spare ICT) along with its auxiliaries • 765kV ICT bays: 2 Nos. (GIS) • 765kV ICT Bay#: 1 No. (GIS) (**"#"-** 01 no. of 765kV GIS ICT Feeder Bay shall be constructed for completion of 01 no. of diameter, which shall be utilized in future for termination of Third ICT bank) • 765kV, 240 MVAr Bus reactor: 1 No. (4x80 MVAR, 765/√3kV, 1-phase reactors including one spare unit) along with its auxiliaries • 765kV Bus Reactor Bay: 1 No. (GIS) • 765kV Line Bays: 04 Nos. (GIS) (2N**os.** for Pune (West)-Pune-III D/C line and 2N**os.** for Pune (West)-South Kalamb D/C line) • All associate 765kV Tie bays: 04 Nos. (GIS)

	Note: Supply & Installation of Common service items of 400KV part of the Substation at Pune (West) GIS, as described elsewhere in this document is envisaged under present scope. **400kV GIS (To be Constructed under separate package):** • 400 kV ICT bays for IV side of 765/400 kV ICTs: 2 Nos. (GIS) • 400 kV Line Bays: 2 Nos. (GIS) • Associated 400kV Tie bays: 2 Nos. (GIS) • Future 400 kV Line bay along with Switchable Line Reactor bay: 8 Nos. • Future bays for IV side of 765/400kV ICT: 1no. • Future bays for 400kV Bus Reactor: 1no. • Future 400 kV Tie Bays: 5 Nos.

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

2.2.1 **765kV Pune (West) New GIS Substation**

2.2.1.1 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. 765kV Gas Insulated Switchgear

The SF6 gas insulated switchgear (50 Hz) shall be of the indoor metal-enclosed type.

765kV SF6 gas insulated switchgear shall have one and a half breaker bus bar arrangement. The Switchgear shall be complete with all necessary terminal boxes, SF_6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment & piping and support structures along with necessary base plate & foundation bolts. In addition all necessary stairs, platforms, supports, fixed ladders, portable scissor lift and walkways etc. as required for operation & maintenance work shall also be provided.

a) 800kV GIS Modules/Equipment as per BPS and description given in **Annexure-IV**.
b) Controlled Switching Devices for 800kV GIS Circuit Breaker as per BPS.
c) Mandatory Spares for 800kV GIS as per BPS.
d) Testing and Maintenance equipment & Motorised type Scissor lift as per BPS.
e) EOT crane for 765kV GIS hall under present scope.
f) Any other equipment/material required to complete the specified GIS scope of work.

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

a) LT Transformer and associated equipment:

800 kVA, 33/0.433kV, LT Transformer (1st) and associated 72.5kV class Circuit Breakers, Isolators, Current Transformers, Potential Transformers, Bus Post Insulators, conductor, clamps, connectors, structures etc. complete in all respect for tertiary loading of 765/400/33kV Autotransformer.

800 kVA, 22/0.433kV LT Transformer (2nd) and associated 22kV class Isolator, HG fuse, Surge Arrestor, Bus Post Insulator, conductor, clamps, connectors, structures etc. complete in all respect for connection with DISCOM Power supply.

b) 765kV VOLTAGE CLASS AIS EQUIPMENT {as per BPS}:

765kV Bus Post Insulators including BPI for Wave Trap (Pedestal Mounted), Capacitor Voltage Transformers, Wave Trap and 624 kV Surge Arresters.

c) 145kV VOLTAGE CLASS AIS EQUIPMENT {as per BPS}:

145kV Bus Post Insulators for Neutral & Auxiliary Neutral bus formation for 765kV class Bus Reactors.

d) 72.5kV Voltage Class BPI for neutral/Delta formation of 765/400kV Auto transformer as per BPS.

e) 33kV VOLTAGE CLASS AIS EQUIPMENT {as per BPS}:

- 33kV Neutral CTs for 2 banks of 765/400/33kV Autotransformer.
- 33kV Bus Post Insulators for Neutral formation and Aux Neutral bus Spare switching of 765/400/33 KV ICTs.

f) The following works pertaining to employer supplied (500MVA, 765/√3)/(400/√3)/33kV Autotransformers & 80MVAr, 765/√3kV Bus Reactors {supply of Transformers & Reactors is covered in separate package(s)} for the bays under present scope, as per details specified in Specific Requirements, Rev-10 enclosed at Annexure-III, are covered under present scope:

i) Formation of Neutral Bus for each Bank, Auxiliary Bus (765kV & 145kV) for switching of Spare Reactor with One Bank of Bus Reactor without physical shifting are in present scope of work. For this 145 kV BPIs shall be supplied as per unit item of BPS.

ii) Formation of Neutral bus, Delta Bus for each Bank of Transformer, Auxiliary Bus (765kV, Neutral & Delta) for switching of Spare Transformer with Two Banks of Transformers without physical shifting are in present scope of work. For this 72.5kV and 33 kV BPIs shall be supplied as per unit item of BPS.

iii) Overhead connection of HV, MV & LV bushings of (765/√3)/(400/√3)/33kV Autotransformers and HV & Neutral bushings of 765/√3kV Bus Reactors to substation equipment's.

iv) Overhead connection of substation equipment's with 765kV & 145kV auxiliary bus of ((765/√3)/(400/√3)/33kV Autotransformers & (765/√3) Bus Reactors as applicable.

v) Supply, laying and termination of cables along with associated accessories from Common marshalling box of (765/√3)/(400/√3)/33kV Autotransformers & 765/√3kV Bus Reactors to Relay panel room/Control Room as per requirement.

vi) 33kV neutral CT for each bank of transformers.

g) CONTROL, RELAY & PROTECTION SYSTEM:

Complete control, relay and protection system as per Section–Control and Relay panels including control, monitoring and protection of LT Transformer connected to tertiary of 765/400/33kV Autotransformer.

New Decentralized (distributed) type of Low Impedance Bus bar Differential protection system shall be provided for Pune (West) GIS Substation at 765kV Level along with Peripheral units of the bays covered under present scope. However, Central unit must have capability to accommodate all present and future 765kV bays as per clause no 2.1 above.

h) SUBSTATION AUTOMATION SYSTEM:

Complete Substation Automation System based on IEC-61850 for bays as per BPS (bay as defined in technical specification, Section-Substation Automation System) including hardware and software along with associated equipment. The contractor shall also supply necessary BCUs for control and monitoring of substation auxiliary system. The SAS shall be suitable for the operation and monitoring of the complete substation including proposed 765kV & 400kV future bays/elements as per clause no 2.1 above.

Necessary interface equipment (Router, Firewall, Ethernet Switches etc.) and integration work for transferring data to RLDC/SLDC (as per requirement), Backup RLDC/SLDC (as per requirement), RTAMC, NTAMC & Backup NTAMC through optical fiber based SDH communication link is also under present scope.

Necessary configuration of data at Gateway for remote operation from NTAMC, Backup NTAMC, RTAMC & supervision from RLDC/SLDC (as per requirement) and Backup RLDC/SLDC (as per requirement) is included in present scope. However, no work is envisaged at remote end (RLDC/SLDC/Backup RLDC/SLDC /RTAMC/ NTAMC / Backup NTAMC) under the present scope.

Integration of CSD, ODS (On-line Oil Drying system) and other accessories based on IEC-61850 for 765kV class Transformers/Reactors (being supplied under separate package), IEC 61850 compatible controllers for auxiliaries etc. with substation automation system along with supply of associated Ethernet switch, LIU patch cords etc. as required, is also included under present scope.

i) DIRECT STOKE LIGHTNING PROTECTION (DSLP):

The lightning protection (DSLP) for complete switchyard area under present scope including Owner supplied 765 kV Class Transformers and Reactors, Buildings is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the structures being provided under present scope. In case, additional structures (Lightning Masts) are required to meet the lightning protection, the same shall be supplied based on employer provided drawings and shall be paid in metric tonnage. The associated civil works shall be payable as per relevant item of BPS, however, earthing of the LMs, buildings as required shall be deemed to be included as part of Erection Hardware BPS item for bays & no additional payment shall be admissible under this head.

j) FIRE PROTECTION SYSTEM

Complete Fire protection system for 765kV class new substation including HVWS spray, Hydrant system and complete piping including all accessories etc. for 765/400/33kV, 1-Phase Autotransformers (Owner supplied), 765kV,1-Phase Reactors (Owner supplied).

Smoke detection, Fire alarm & annunciation System for 765kV GIS Hall, Relay Panel Rooms, AHU Room and Control Room Building.

Fire-fighting system including alarm & annunciation panels shall be suitable for complete substation scope i.e. for all present and future 765kV & 400kV bays/ ICTs/Reactors as mentioned in clause 2.1 above. The scope shall also cover Hydrant system including complete piping, fittings & accessories, etc. for Control Room Building, GIS Building, FFPH, LT system, Store, etc. as per Technical Specification.

k) AIR CONDITIONING & VENTILATION SYSTEM:

Air Conditioning System for Control Room Building, Battery Room and Relay panel Room of 765kV GIS Halls including ventilation system of 765kV GIS Hall.

Distribution of Air Conditioning of CRB shall be as per employer drawing provided during detail engineering.

l) LT SWITCHGEAR

LT switchgear (AC/DC Distribution boards) considering all present and future 765kV & 400kV bays/ICTs/Reactors as mentioned at Clause 2.1 above. AC/DC system shall be provided as per the specified scope of work including future provisions, in line with the LT SLD drawing No C/ENGG/STD/LTSWGR765/SLD/01 Rev-0 attached at **Annexure-I.**

m) BATTERY AND BATTERY CHARGERS:

The capacity of Battery & Battery chargers shall be worked out by contractor for complete substation scope including future bays mentioned at clause No 2.1 above and shall be submitted for Employer's approval.

However, minimum capacity of battery & Battery charges should Not be less than that as specified below

- 220V VRLA BATTERY: 1500 AH
- 48V VRLA BATTERY: 2500AH
- 220 V BATTERY CHARGER: 225 A
- 48V BATTERY CHARGER 375 A

In case, battery and battery chargers of higher capacity/rating are required to cater the actual load requirement based on design calculations during detailed engineering, same shall be provided by contractor without additional cost to Employer.

In addition to above, Nickel cadmium battery in lieu of VRLA Battery specified in Section Battery & Charger shall also be acceptable for this package. The technical parameters for Nickel Cadmium batteries are attached as **Annexure-VIII.**

n) DG SET ALONG WITH AMF PANEL

500kVA Silent type outdoor DG Set along with AMF panel as per TS.

o) 1.1kV POWER & CONTROL CABLE:

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 marshalling box of owner supplied 765kV Transformers & Reactors to Relay panel room /control room. Power receptacle for oil filtration unit shall also be provided under present scope of work as per BPS.

Methodology for supply, installation & sizing of cables shall be as per **Annexure-X.**

p) HV CABLE:

22kV HV cable along with complete accessories viz. termination kit, lugs, glands, clamps etc. for connection of LT Transformer with DISCOM supply.

q) ERECTION HARDWARE:

This item of BPS includes Insulator strings hardware, Disc Insulators/Long Rod Insulators (as applicable), conductor(s), Al tube, bus-bar materials, cable trays & covers, Cable Pull pit, Bay MB (as applicable), spacers, clamps & connectors (including terminal connectors for 765kV, 145kV, 52kV, 36kV bushings of owner supplied 765kV class Transformers/Reactors), Junction box, earth wire, earthing material risers, auxiliary earth mat, buried cable trenches/pipes for equipment & lighting { including PVC Pipes for laying

cables between IMB of each unit of transformer/reactor and their CMB}, cable supporting angles/channels, Insulating mats, cable sealing arrangement, insulator guy arrangement, all accessories etc. as required.

r) MAIN EARTHMAT (As per BPS):

Main Earth mat to be provided for switchyard area under present scope of work. Payment against main earthmat shall be regulated as per actual Length laid at site All the equipments (including employer supplied (765/√3)/ (400/√3)/33kV Autotransformers, 765/√3kV Reactors along with their auxiliaries), LT station, FFPH, DG Set, Control room area, buildings, cable trenches, auxiliary earth mat etc. shall be earthed by connecting them to the main Earth mat. Earthing of structures for all auxiliary buses shall also be in the present scope. Employer supplied 1-Ph Spare unit of (765/√3)/(400/√3)/33kV Autotransformers & 765/√3kV Reactors (80MVAr) shall also be connected to grounding system through jumper/Copper flat when they are in uncharged condition. Cost against the same shall be deemed to be included in the respective items under Erection Hardware.

For 765kV GIS grounding inside the GIS building, contractor shall refer Annexure-S10 of Specific requirement, Rev 10 and the same shall be deemed to be included as Part of GIS equipment.

s) ILLUMINATION SYSTEM:

LED based Lighting and illumination for the switchyard area under present scope, Streets, 765kV GIS building including Relay Panel Room & AHU room, Control Room cum administrative building, Fire Fighting Pump house, DG Set area and LT station area, security room, etc. shall be provided by the contractor.

All required items /equipment /fixtures/ panels/ receptacles/ switches/ switchboards/ fans etc. for Illumination of Control Room Building, GIS building including Relay Panel Room, FFPH, DG Set area, Security Hut, etc. (as applicable) are deemed to be included under corresponding item of BPS.

Illumination in CRB shall be provided based on employer provided drawing during detailed engineering. However, other layouts for indoor and outdoor illumination shall be prepared by Contractor. The fixtures for indoor illumination shall be supplied as per the Qty. specified in the attached **Annexure-IX**, and the fixtures for outdoor illumination shall be as per BPS.

t) PLCC EQUIPMENTS:

(i) New PLCC equipment including Analogue protection coupler, Digital Protection Coupler (suitable for interfacing with E1 port of SDH equipment), FO Boxes, FODP on gantry, signal converters, Power & communication cables etc. for both substation ends of following lines:

- Pune (West)- Pune-III 765 kV D/C line.

(ii) DISMANTALING, TRANSPORTATION AND RE-ERECTION OF PLCC:

- Dismantling & shifting of existing PLCC equipment's of Pune-III - South Kalamb 765kV D/c Line from 765kV Pune-III Substation and installation & commissioning of the same at Pune (West) Substation for use in Pune (west)- South Kalamb 765kV D/c Line.

u) VISUAL MONITORING SYSTEM (VMS): Visual monitoring system for watch and ward of substation premises as per technical specifications. Further, in addition to the gates of the

switchyard, the cameras shall also be located around the boundaries of entire S/s plot at suitable locations.

Advisory on deployment of CCTV issued by Ministry of Electronics and Information Technology (MEITY) shall be followed.

v) TELECOMMUNICATION SYSTEM:

The broad Scope of the pr23ocurement 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 associated hardware set and Fibre Optic Distribution Panel (FODP)

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

w) PHASOR MEASUREMENT UNIT (PMU):

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

ii) The PMU shall comply with latest version of IEC/IS 60255-118-1-2018 and IEEE C 37.118.2 protocols standards.

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

iv) The Contractor shall extend technical support at Substation end for seamless integration of PMU with PDC at respective RLDC/SLDC end. The integration work at RLDC/SLDC end will not be under the scope of the Contractor. The PDC at RLDC/SLDC is of M/s GE make.

v) The PMU supplied in this project shall support measurement of voltages and currents of at least 2 feeders/bays.

vi) All cabling and interconnections for extension of CT/CVT, Digital inputs from the Line Bays, ICTs/Reactors/STATCOM bays up to PMU panel for measurement by PMU, shall be in the scope of the Contractor. Accordingly, the associated 1.1KV Control cables as required for Non-Adjacent Inter- Control and Relay panel (CRP) CT /PT connections & Digital input connections to PMU panel shall also be under the Contractor's scope. The scope of these cabling work (supply, laying & termination), as applicable in the subject project, shall be deemed to be included in the price of PMU equipment.

vii) Validity of Type Test for PMU shall be as per CEA Guidelines January 2026.

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

2.2.1.2 Design, engineering, manufacture, testing, supply including transportation & insurance, unloading, storage, testing at site of Mandatory spares as per bid price schedule. The Break-up of Mandatory Spares for items except GIS Equipment shall be as per **Annexure-II**.

2.2.1.3 **Civil works:**

A. 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.

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

(i) Site levelling work: The item site levelling works includes Contouring of whole plot area within the substation boundary as per technical specification. The final area of levelling may be less than the whole plot area, which will be decided during detailed engineering.

a) The Quantity of earthwork cutting & filling borrowed earth and FGL shall be proposed by vendor for approval of POWERGRID based on the approved contour level drawing and site HFL data.

b) Mode of measurement of this item is in Cum of earthwork as per BOQ and technical specification. The contouring of the plot area in scope as per technical specification is also deemed to be included in quoted rates of this item.

c) HFL data duly verified by POWERGRID Site is required to be arranged by contractor for finalization of FGL (Finished Ground Level).

(ii) Soil investigation work including soil resistivity:

a) Soil investigation needs to be conducted as per the technical specification. The necessary soil investigation layout and final soil report shall be proposed by vendor for approval of POWERGRID.

b) Mode of measurement of this item is Lumpsum as per BOQ.

(iii) Slope Protection Works & Retaining Walls: Design & Drawings pertaining to slope protection works & retaining walls (if required) shall be finalized during detailed engineering and same shall be measured under respective line items of BPS.

(iv) Switchyard cable trench: Cable trenches including cable trenches in Reactor/Transformer area along with covers including road/rail crossing, sump pits, culverts etc. shall be constructed as per the following:

a) Cable trench layout shall be prepared by vendor for approval of POWERGRID.

b) The cable trenches shall be precast RCC type (except for Section 1-1 which shall be cast in situ).

c) The tray arrangement to support cables shall be provided using MS angles.

d) Sump pits for cable trench network shall be cast in situ.

e) The cable trench drawing attached in the tender documents shall be referred for trench width, depth and tray arrangement (number, pattern and angle section for trays) only.

f) The design and drawings shall be prepared and submitted by contractor for approval.

g) Minimum grade of concrete for precast members shall be M25.

h) Precast members shall be reinforced with steel reinforcement which shall be as per Technical Specification.

i) Minimum thickness of precast members shall be 80 mm.

j) Standard Field Quality Plan for *Pre-cast Concrete of Cable Trench/Precast Covers & Columns, Wall Panels of Boundary* available on POWERGRID website shall be followed.

k) Mode of measurement for precast RCC cable trench in switchyard shall be in running meter. The items Excavation, PCC, RCC, Reinforcement steel, Structural steel, cable trench crossings, erection etc. wherever required and all other civil works required as per technical specification and drawings complete in all respect for successful completion of the works are deemed to be included in quoted rates.

l) Mode of measurement for sump pits for cable trench network in switchyard: various items shall be measured and paid under respective heads {quantity of earth work (excavation, backfilling, disposal etc.), PCC, RCC, reinforcement steel and structural steel.

(v) Firewall:

a) The firewalls shall be precast RCC type.

b) The design and drawings shall be prepared and submitted by contractor for approval.

c) Minimum grade of concrete for precast members shall be M25.

d) Precast members shall be reinforced with steel reinforcement which shall be as per Technical Specification.

e) Minimum thickness of precast members shall be 80 mm.

f) Minimum thickness of column and beam for fire resistance shall be governed by IS 456.

g) Wall portion shall have two number of precast panels (each 80 mm thick) with an air gap (minimum 200 mm) between these two panels.

h) Columns, beams and footings can be either cast in situ or precast.

i) Precast elements are not required to be finished with cement wash, only cast in situ members shall be finished with cement wash.

j) Standard Field Quality Plan for Pre-cast Concrete of Cable Trench/Precast Covers & Columns, Wall Panels of Boundary available on POWERGRID website shall be followed for precast firewalls as well.

k) Mode of measurement for precast firewall shall be in square meters (area of the fire wall shall be measured as length of firewall multiplied by height of firewall (above FGL)). The items Excavation, PCC, RCC, Reinforcement steel, Structural steel, erection, cement wash (if required) etc. wherever required and all other civil works required as per technical specification and drawings complete in all respect for successful completion of the works are deemed to be included in quoted rates. The work for foundations (shallow depth or deep foundations) shall be deemed to be included in these quoted rates itself. However, any ground improvement required for firewall (like stone packing, stone columns) shall be measured and paid separately.

(vi) 765kV GIS Building, AHU & Panel Room:

a) GIS Hall Building, Relay room and AHU room shall be provided for the same. Indicative architectural drawing of 765kV GIS Hall is attached with the tender drawings for reference.

b) The drawing shows GIS Hall in Modular units of 8mX19m, LCR Room in Modular Units of 4mX3.5m and one AHU Room of size 8mX7m. However, the dimensions of the building as per actual requirement shall be finalized during detailed engineering based on the equipment layout and requirement of technical specifications.

c) The details pertaining to location of doors/ windows/ rolling shutters and entry / exit points shall be as per the attached drawing.

d) Complete Structural Design and Structural Drawings of the 765kV GIS Hall shall be prepared by the contractor as per Technical Specifications and submitted for approval of employer.

e) Other details of the GIS Hall like architecture, finishing, joinery, drainage etc. shall be prepared by the contractor as per Technical Specifications and submitted for approval of employer.

f) EOT crane shall be provided in the 765kV GIS Building as per relevant section of technical specification.

g) All civil works including foundations associated with erection of SF6 gas insulated metal enclosed switchgear along with its SF6 bus ducts upto the outer edge of the wall of GIS building. Civil works including all foundations for all equipment inside GIS building.

h) The cable trenches inside GIS halls & associated LCC/Relay rooms.

i) Foundation for Bus duct supporting structures outside GIS Hall & GIS (SF6/Air) bushing.

j) Mode of measurement for Pre-engineered Steel Building shall be made on plinth area basis. Plinth area shall be calculated based on IS 3861-2002. However, the quantity of earth work (excavation, backfilling, disposal etc.), concrete (all type), reinforcement steel shall be measured & paid separately as per relevant clauses as per TS. The payment for remaining finishing items shall be made on plinth area basis for each building including cable trenches, internal & external finishes, stone soling for flooring, plinth protection, drain along plinth protection, electrical conduit & junction boxes, fan boxes, cable transit system, miscellaneous structural steel required for seating of GIS equipments, cable supports in cable trenches, chequered plates etc inside GIS building complete in all respect.

(vii) Design and Drawings of Closed and Semi-Closed Store Building:

a) The architectural drawings for Closed cum Semi closed store are attached as a part of tender drawings. Based on the architectural drawings, complete Structural Design and Structural Drawings, Shop drawings, joinery details, drainage etc. of complete structure shall be prepared by the contractor as per Technical Specifications enclosed at **Annexure-XII** and submit for approval.

b) Mode of Measurement of these items is in Sqm as per BOQ. However, Excavation, PCC, RCC, Reinforcement steel only shall be paid separately as per BPS.

c) No additional payment shall be made for any other works, materials, or activities required for the complete execution of the building in all respects as per the approved drawings.

(viii) Other miscellaneous requirements & scope:

a) Stone spreading and anti-weed treatment in the switchyard for area under present scope. Layout for the same shall be developed by the contractor.

b) Providing & laying of non-woven Geo-synthetics fabric of minimum 200 GSM in separation layer between sub grade and stone spreading in switchyard.

c) Permanent water supply (internal & external) for Security hut, control room building, Firefighting pump house building, water tank and labour hut.

d) Laying of plumbing and external sewerage system for control room building, Security hut, labour hut.

e) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles wherever required. The cost of these foundations shall deemed to be included in erection/installation of corresponding item/ equipment of BPS.

f) For all building except labor hut, all doors except fire escape doors, windows, glazed partitions shall be of UPVC type.

(ix) Any other item/design/drawing required for successful completion of the scope of works.

(x) Supply, installation and maintenance of porta cabin containers as per BPS and technical specification. The technical specifications for porta cabin are enclosed as **Annexure-XI**. The measurement shall be done based on plinth area on monthly basis.

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

(i) Pre-cast RCC boundary wall:

a) Pre-Cast RCC boundary wall shall be constructed as per the POWERGRID standard drawing provided in tender. The rise/fall in boundary wall foundation shall be provided wherever the difference in ground level is more than 300mm.

b) Gratings shall be provided wherever required without any additional cost.

c) Mode of measurement of this item is in RM as per BOQ. The items Excavation, PCC, RCC, Reinforcement, Misc. Structural steel, concertina coil and all other civil works required as per technical specification and drawings for successful completion of the works are deemed to be included in quoted rates.

(ii) Security hut:

a) The drawing pertaining to Security hut is attached as a part of tender drawings.

b) Septic tank and soak pit for this building shall be paid separately as per BOQ.

(iii) Labour hut: The drawings pertaining to Labor hut are attached as a part of tender drawings.

1. The drawing pertaining to Labour hut is attached as a part of tender drawings. The plinth area BOQ item for Labour Hut excludes septic tank and soak pit.
2. Septic tank and soak pit for this building shall be paid separately as per BOQ.
3. Facilities for labour shall be constructed on the land provided by POWERGRID inside the substation premise.

(iv) Main Entrance Gate as per drawing

(v) Switchyard Gate as per drawing

(vi) Bituminous Road including Road Crossing

Bituminous Road including approach road (if any), shall be constructed as per POWERGRID standard drawings provided in tender. However, Road layout shall be prepared by vendor for approval.

(vii) Rainwater Harvesting

(viii) Drains: Drain layout including peripheral drains if any required along the boundary shall be prepared by vendor and to be submitted for approval of POWERGRID based on the standard sections. Diversion of existing Nallah/ Surface runoff, if required, the design & drawing of drains shall be prepared by contractor along with the drain layout and same shall be submitted to POWERGRID for approval. Payment shall be made under respective items of BPS." The rate shall include the cost of all works such as excavation, PCC, RCC,

Reinforcement Steel, screed concrete, plastering, NP-3 RCC Hume pipes in crossings, culverts, brick work etc. as per drawings and technical specifications.

(ix) Switchyard barbed wire fencing: Fence layout shall be prepared by vendor and to be submitted for approval of POWERGRID based on the standard sections.

(x) Gantry tower, beam Structure and LM: Gantry tower , beam & LM shall be provided as per Employer's drawings during detailed engineering. However, if required, POWERGRID may also 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.

(xi) Foundations of Gantry Towers and LM:

a) Foundations of 765kV Gantry Towers and LM.

b) The foundations of these structures are including of embedment/grouting of foundation bolts.

(xii) Foundations Transformer and Reactors: Foundation of all Transformers and Reactors including Rail cum road, unloading platform, jacking pad, Oil Pit/Common Oil pit, pulling blocks, gratings, etc. as per technical specification.

Transformer/reactor foundation shall have sump pit without grating and it shall be connected to the common oil collection pit by means of Hume pipes. All required manholes including their covers are deemed to be included in the corresponding item of arrangement.

(xiii) Structure and Foundation for transformers and reactors neutral and tertiary delta formation: Structure and foundation for tertiary delta, and neutral formation for 1-Ph Transformers, neutral formation for 1-Ph Reactors and associated spare unit connection arrangement without physical shifting.

Structure and foundation for 33kV NCTs (as applicable).

(xiv) Equipment Support Structures: 765kV, 132kV, 72.5kV & 36kV Equipment support structures except support structures for Circuit Breaker. The Support structure for Circuit Breaker shall be as per manufacturer's design which is deemed to be included in cost of respective CB.

(xv) Foundations of Equipment Support Structure:

a) 765kV, 132kV, 72.5kV and 36kV Equipment support structure foundations, including CB foundation, Tertiary and Auxiliary Transformer foundation, DG set Foundation.

b) The foundations of these structures are including of embedment/grouting of foundation bolts.

(xvi) Foundation and structure drawing of double pole structure.

(xvii) Control room Building:

CRB shall be constructed as per POWERGRID drawings. Architectural Drawing of CRB is attached as a part of tender drawings, however, the detailed construction drawings shall be provided to the successful bidder during detailed engineering.

(xviii) Septic Tank and soak pit for CRB:

Septic tank and soak pit for CRB shall be constructed as per POWERGRID standard drawings provided in tender drawing. Structural drawings shall be provided to the successful bidder during detailed engineering.

(xix) Firefighting pump house and Fire water tank:

The drawings pertaining to Firefighting Pump House and Fire Water Tank are attached as a part of tender drawings.

(xx) Open Store Yard: Open Store Yard shall be constructed as per POWERGRID drawings attached as a part of tender drawings.

Mode of Measurement of this item is in sqm as per BOQ. However, concrete & reinforcement only shall be paid separately under respective item of the BPS.

D. For buildings, the complete civil works including internal and external finishing, stone soling for flooring, Structural steel, plinth protection, drain along plinth protection, electrical conduit and junction boxes, fan boxes, cable transit system etc. required to complete the building in all respect as per the drawing shall be payable in the plinth area rate. However, the quantity of earthwork (excavation, backfilling, disposal etc.), concrete (all types), reinforcement steel, shall be measured and paid under respective items under BPS.

2.3 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.

2.4 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. SPECIFIC EXCLUSIONS

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

a) Transit camp.
b) Supply, erection, testing & commissioning of 500 MVA, (765/√3)/(400/√3)/33kV, single phase autotransformers, 80 MVAr, 765/√3 kV single phase shunt reactors
c) Cabling from IMB to CMB of 765kV Transformer/Reactor.

4. 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.	765/400 kV Pune (West) GIS S/s	Maharashtra	Pune

4.2 Meteorological data

The meteorological data are as below

Station Name	765/400 kV Pune (West) GIS S/s
Altitude	Less than 1000 meter above mean sea level (MSL)
Snow fall	NIL
Seismic Zone	As per IS 1893 (Part 1)
Wind Zone	NBC 2016
Min./Max. Ambient Temperature	0 / 50 degree centigrade
Coastal Area consideration	**No**

4.3 Fault level shall be considered as mentioned below:-

Sl. No.	Name of Substation	765kV	400kV
1.	765/400 kV Pune (West) GIS S/s	50kA for 1 Sec	63kA for 1 Sec

5. 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. BASIC REFERENCE DRAWINGS

a) 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.

b) The substation shall be designed considering current ratings as indicated below-

Sl. No	Description of bay	765/400 kV Pune (West) GIS S/s
		765kV
1.	Bus Bar	4000A
2.	Line bay	3150A
3.	ICT bay	3150A
4.	Tie bay	3150A
5.	Bus Reactor Bay	3150A
6.	Auxiliary Busbar for ICT	3150A
7.	Auxiliary Busbar for Reactor	3150A

c) Following switching schemes are envisaged under present scope:

Name of substation	765kV Bus switching scheme
765/400 kV Pune (West) GIS S/s	One & half breaker scheme

d) 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.

e) 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.

f) INPUTS TO BE PROVIDED DURING DETAILED ENGINEERING

i) Location of identified land and Plot plan for land shall be provided to successful bidder during detailed engineering.

ii) Transmission line side conductor type & configuration of conductors for transmission lines of various voltage levels.

7. 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.

Sl. No.	Description	Revision
1.	Section - Project	Rev 00
2.	Section - General Technical Requirement	Rev 16
3.	Section - Gas Insulated Switchgear (GIS)	Rev 05A
4.	Section - Switchgear Instrument Transformer	Rev 12
5.	Section - Switchgear SA	Rev 13
6.	Section-Switchgear- CB	Rev 12
7.	Section-Switchgear- ISO	Rev 13
8.	Section- LT Transformer	Rev. 07
9.	Section- LT Switchgear	Rev. 05
10.	Section- Battery & Charger	Rev. 07
11.	Section- DG Set	Rev. 05
12.	Section - Power & Control Cable	Rev 06
13.	Section - Fire Protection System	Rev 06
14.	Section - Air Conditioning System	Rev 04
15.	Section - Lighting System	Rev 07
16.	Section - Switchyard Erection	Rev 10
17.	Section – Structure	Rev 07
18.	Section - Civil Works with corr. Slip 1	Rev 12
19.	Section - Control & Relay Panel	Rev 09
20.	Section - Substation Automation System	Rev 04
21.	Section – PLCC	Rev. 05
22.	Section – Telecommunication System	Rev. 06
23.	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 equipments, 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 be referred to.

8. MANDATORY SPARES

The 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 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 generally 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 is 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. 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-III) 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-III) on scope of works, the requirement stipulated at clause 9.0 of section project shall prevail.

9.2 Sl. No. A. Section: GTR Rev 15 of Specific requirement, Rev 10 (attached at Annexure-III) stands deleted.

9.3 For one and half breaker switching scheme Two transformers of same HV rating shall Not be connected in the same diameter and similarly, two bus reactors of same HV rating shall also Not be connected in the same diameter.

9.4 For one and half breaker switching scheme, any double circuit line consisting of two numbers of feeders and originating from the same transmission or generating switchyard shall Not be terminated in one diameter.

9.5 **800kV GIS Modules/Equipment description** given in **Annexure-IV** shall be referred. 800kV GIS Modules/Equipment description provided at Annexure-S11 of Specific Requirements as

mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 (attached as Annexure-III) stands deleted.

9.6 For 765kV ICT feeder bay for completion of 01 No. of 765kV diameter, which shall be utilized in future for interconnection with 765/400/33kV ICT-3 (F), 765kV GIS bus ducts shall be brought outside the 765kV GIS building and provided with end Piece (Interface) module suitably with isolating test link under present scope for future connections. Associated end piece (Interface) module shall be deemed to be part of outdoor GIB duct. Outdoor Bus duct including end piece (Interface) module for 765kV ICT feeder bay, shall be measured from outer edge of the wall of the 765kV GIS Hall/Building & Shall be paid separately, against respective BPS items.

9.7 Clause no. 5.27 of Section: GIS, Rev-05A is modified as follows:
Suitable portable scissor lift (as specified in BPS) for GIS shall be provided for access of distant portion of GIS installation. Technical Specification for Scissor Lift is attached at **Annexure-V**

9.8 Sl. No. C. Section: Switchgear - CB, Rev 11 of specific requirement, Rev-10 (attached at Annexure-III) stands deleted.

9.9 Clause no. 1.2.2 in Section: Battery & Battery charger, Rev-06 is modified as follows:
Constructional Requirement: The design of battery shall be as per field proven practices. Partial plating of cells is Not permitted. Paralleling of Cells externally for enhancement of capacity up to 1500AH is Not permitted. For higher capacity, the number of such paralleling shall be restricted to 3 only and minimum capacity of the basic cell is to be closer to 1500AH as applicable. Protective transparent front covers with each module shall be provided to prevent accidental contact with live module/electrical connections.

9.10 Clause no. 1.2.8 of Section: Battery & Battery charger, Rev-06 is modified as follows:
Connectors, Nuts & Bolts, Heat Shrinkable Sleeves: Where it is Not possible to bolt the cell terminals directly to assemble a battery, separate Non-corroding lead or copper connectors of suitable size shall be provided to enable connection of the cells. Copper connections shall be suitably lead coated to withstand corrosion due to sulphuric acid at a very high rate of charge or discharge.
Nuts and bolts for connecting the cells shall be made of copper, brass or stainless steel. Copper or brass nuts and bolts shall be effectively lead coated to prevent corrosion. Stainless steel bolts and nuts can be used without lead coating.
All inter cell connectors shall be protected with heat shrinkable PVC sleeves.

9.11 For Circuit breaker(s) controlling 400kV Transmission line(s), with or without Line Reactor and 765kV Transmission line(s) without Line Reactor, Controlled Switching Device (CSD) suitable for Line Switching Application in lieu of PIR shall also be acceptable.

The above CSD provided for the transmission line application shall be used for controlled energization to minimize the switching overvoltage in the line during dead-line charging as well as during re-energization as part of auto-reclosure sequence. It is required that the performance of the circuit breaker with CSD for transmission line switching shall be equivalent to or better than that of a circuit breaker equipped with a Pre-Insertion Resistor (PIR).

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

9.13 Minimum specified creepage distance for **Switchyard equipments** including insulator string/ long rod insulators/ outdoor bushings shall be 31 mm/kV.

9.14 **Annexure S1** of Specific Requirements Rev 10 is replaced with Annexure S1 (Revised) and enclosed as **Annexure-X** of Section Project for METHODOLOGY FOR SIZING OF CABLES.

9.15 Annexure-S7 mentioned in Sl. No. L.6 Section: SAS, Rev 04 of specific requirement Rev 10 stand deleted.

9.16 Sl. No L.6 Section: SAS, Rev 04 of Specific Requirement (Rev 10), Clause No. 4.1.6 of Section SAS (Rev 04) is modified as:

Firewall and Router

There shall be two sets of Firewall and Routers which shall be connected to a LAN. This LAN shall be different than the IEC 61850 LAN. The substation firewall and router shall be suitable for the substation environment and shall comply with the requirements for IEC 61850-3.

Contractor shall provide 2 Nos. Firewalls; one No. Main & one No. Standby having electrical ethernet interfaces/ports and placed between FOTE & SAS gateways, NTAMC switch etc. at the substation. All ethernet based applications (e.g. PMU, AMR, VOIP, SAS/SCADA etc.) shall be terminated in the firewall ports directly. Each port of firewall shall work as a separate zone. Firewall shall be hardware based with functionality of Block/Allow/drop and IPSec VPN (network encryption). Minimum 16 Nos. of ports/interfaces shall be provided in each firewall (i.e. Main & Standby) Contractor can use either single firewall or multiple firewalls to meet this interfaces requirement, each for main as well as standby firewall.

Minimum throughput of firewall shall be 300 Mbps. The Firewall shall be managed/ configured as standalone at present and shall also have compatibility to manage/configure through Centralized Management Console (CMC) remotely in future.

The substation firewall shall have the following features:

- IP firewall features such as Address/port inspection and filtering
- Shall be stateful firewall
- Shall support upto 4 Ethernet switches 10/100 Mbps
- Shall support IPv4 and IPv6
- Shall have IP sec/VPN with 3DES/AES encryption
- Shall have NAT
- Shall have syslog capability
- Shall be NERC compliant
- Shall have hot- standby operation with similar router

The substation routers shall have the following features:

- Routing protocols such as OSPF and support for IPv4 and IPv6
- 8 Ethernet interfaces of 10/100 Mbps
- Hot standby operation with a similar router
- Support IEEE 802.3u, 802.1p, 802.1Q, 802.1d, 802.1w,
- Traffic prioritization for routed IP flows/ports

The substation firewall and router can be a single device.

Deployed Firewall & Routers shall act as Cyber Security System in compliance with CEA (Cyber Security in Power Sector) Guidelines, 2021 and CEA (Cyber Security in Power Sector) Regulation, from its date of publication/ Notification and their amendments thereof.

9.17 Sl. No. L.7 Section: SAS, Rev 04 of specific requirement, Rev-10 (attached at Annexure-III) stands deleted.

9.18 Clause no. 32.1 of Section: CRP Rev 09 is modified as follows:
The Time Synchronizing equipment shall receive the coordinated Universal Time (UTC) transmitted through NAVIC (Navigation with Indian Constellation), in addition to Global Positioning System (GPS), and synchronize equipment to the Indian Standard Time (IST) in a substation.

9.19 Establishment of CCTV System for Construction Monitoring of entire switchyard shall be as Sl. No. A.7 of SPECIFIC REQUIREMENT Rev. no 10 enclosed at **Annexure-III.**

9.20 The technical parameters for 22kV equipment is enclosed at **Annexure-VI**.

9.21 **New Clause no. 8.3.2 under Section: Switchyard Erection (SE), Rev 10 added**:

Polymer BPI in lieu of Porcelain type BPI is also technically acceptable (upto 400kV Voltage level) for support applications (Except for Isolators & Wave Traps). The technical specification for polymer type BPI is attached at **Annexure-VII**.

9.22 **Clause no. 3.4.6 of Section Air Conditioning Rev 04 is modified as below:**
Required Features of Various Components
The compressor shall be very reliable, trouble free and long life i.e. hermetically sealed Scroll **or Rotary type** of reputed make suitable for continuous operation. Compressor should be installed on vibration isolated mountings or manufacturer's recommended approved mounting. Valve shall be provided for charging/topping up of refrigerant. The bidder shall furnish details of their compressor indicating the MTBF, life of compressor and continuous run time of compressor without failure. The contractor shall also furnish details of all accessories, i.e. refrigeration system, evaporator coil, condenser coil, evaporator blower, filter, cabinet, indoor supply and return grill etc. during detailed engineering.

9.23 For Switchyard Lighting, all the required cables, accessories, SLP/JB, etc. as required from ACP to luminaires shall be assessed and supplied by the contractor. The price of these items shall be deemed to be included in price of luminaires.

9.24 In Section-GTR and other technical specifications, the term 'Employer and/or 'Purchaser/Customer' may be read as Employer.

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