

PART 2: EMPLOYER'S REQUIREMENTS

CHAPTER: EXPLANATORY NOTES- RSS

Table of Contents

1	Bill No. B1. HVC-S&HVC-E 220kV CABLE.....	8
	ITEM No.1.1: Supply of 220KV EHV Cables	8
	ITEM No. 1.2: Supply of Straight Through Joints	8
	ITEM No. 1.3: Supply of OUTDOOR Terminations.....	8
	ITEM No. 1.4: Supply of INDOOR Terminations	8
	ITEM No. 1.5: Link Box with SVL.....	9
	ITEM No. 1.6: Link Box with with-out SVL.....	9
	ITEM No. 1.7: Supply of OFC Cable	9
	ITEM No.2: ERECTION, TESTING & commissioning of 220kv cabling system	9
	item No.2.1: Laying, testing & commissioning of 220kv cable	9
	item No.2.2: handling and making of straight through joints.....	10
	item No.2.3: handling and making of outdoor termination.....	10
	item No.2.4: handling and making of cable termination.....	10
	item No.2.5: Erection of three phase earth link box.....	10
	item No.2.6: Erection of three phase earth link box.....	10
	item No.2.7: laying of pilot wire cable.....	10
	ITEM NO.3: Cable Laying, testing and commissioning	10
	ITEM NO.3.1: 220kv cable laying, through trenchless, laying on underground, in pipes/ducts including cable route survey (4.5km).....	10
	ITEM NO.3.1.1: Detail route survey.....	10
	ITEM NO.3.2: making of cable path (3.2.1 TO 3.2.14).....	12
	ITEM No.3.4: Testing and Commissioning.....	12
	ITEM No.4: 33KV CABLE	12
	ITEM No.4.1,4.2&4.3: 33KV CABLE SUPPLY, ERECTION, TESTING AND COMMISSIONING....	12
	ITEM No.5: 25KV and 3.3kv CABLE	12
	ITEM No.5.1: 25KV CABLE supply.....	12
	ITEM No.5.2: 25KV cable erection and commissioning	13
	ITEM No.5.3: 25KV cable termination kit	13
	ITEM No.5.4: 3.3kv cable SUPPLY.....	13
	ITEM No.5.5: 3.3kv cable.....	13
	ITEM No.5.6: 3.3kv cable TERMINATION.....	13

2	Bill No. B2. GIS-S-GIS-E 220KV RSS.....	13
	ITEM No.6: 220 kV GIS switchgear.....	13
	ITEM No.6.1: 220 kV GIS Incoming Bays.....	13
	Item 6.2: 220kv Traction Transformer feeding bay	14
	Item 6.3: 220kv Auxiliary Transformer feeding bay	14
	Item 6.4: 220 KV GIS coupling bay	14
	Item 6.5: Bus VT modules and bus bars and other items as per specifications.....	15
	item No 7: 220kv gis Erection, Testing and Commissiong.....	15
	item No 8: Lighting cum Lightening Mast.....	15
	item No 9: Control and Protection panel for 220kv GIS.....	15
	Item No. 9.1 Incomer Bays.....	15
	Item No. 9.2: Outgoing Bays for AT BAYS.....	15
	Item No. 9.3: Outgoing Bays for TT BAYS	15
	Item No. 9.4: Bus Coupler Circuit.....	16
	Item No. 9.5: For Bus Bar Protection.....	16
	item No.10: SAS SYSTEM.....	16
	Item No.10.1: Server Equipments	16
	Item No.10.2: Gateway.....	17
	Item No.10.3: Converter	17
	Item No.10.4: Printers	17
	Item No.10.5: Storage, Desk and Chairs.....	17
	ITEM No.11: UPS/Inverter.....	17
	Item No.11.1&11.2: 415 V, 3-Phase, 5 KVA UPS with Battery.....	17
	item No.12: Control Wiring and cable trays	18
	Item No.12.1&12.2: LV control cables	18
	Item No.12.3: cables trays.....	18
	ITEM No.13: T-1 TRACTION SUBSTATION	18
	Item No.14.1&14.5: 25 KV GIS Incoming Bays	19
	Item No.14.2&14.6: 25 KV Outgoing Bay.....	19
	Item No.14.3&14.7: 25 kV GIS Coupling Bay.....	20
	Item No.14.4&14.8: 25 KV GIS Bus VT modules and bus bar and other items as per specifications.....	20
	ITEM NO 15: 25kV Control and Protection Panel	20
	Item No.15.1&15.4: CRP for incoming feeder	20

2.1	Item No.15.2&15.5: CRP for Outgoing feeder	21
2.2	Item No.15.3&15.6: CRP for bus coupler feeder	21
	Item No.15.7: Earthing & return current equipment/ Buried rail.....	21
	item No.16: A1- Auxiliary Main Sub-Station	22
	Item No.16.1.: Auxiliary Transformer.....	22
	Item No.16.1.1&16.1.7:.....	22
	Item No.16.1.2 & 16.1.8: Primary Neural Isolator.....	22
	Item No.16.1.3 & 16.1.9: Primary Neutral Current Transformer	22
	Item No.16.1.4 & 16.1.10: Primary Neutral Lightning Arrester	22
	Item No.16.1.5 & 16.1.11: Neutral Grounding Resister.....	22
	Item No.16.1.6 & 16.1.12: Fitting and other components.....	23
	ITEM No.17: 33KV Panel.....	24
	Item No.17.1: 33kV Incoming Panel	24
	Item No.17.2: Outgoing circuit breaker.....	24
	Item No.17.3: Coupling circuit breaker	24
	Item No.17.4: Measuring and protection equipment.....	24
	Item No.17.5: Control and Monitoring Equipment (IED).....	25
	Item No.17.6: Erection, Testing and Commissioning of 33kv Switchgear	25
	ITEM No.18: 33/0.415 kV, 200kVA Auxiliary Transformer	25
	Item No.18.1&18.2: 200kVA Auxiliary Transformer	25
	Item No.19: Auxiliaries.....	25
	Item No.19.1&19.2: Battery Chargers.....	25
	Item No.19.3&19.4: Batteries	25
	Item No.19.5&19.6: 415V AC Distribution Board	26
	Item No.19.7&19.8: DC Distribution Board	26
	Item No.19.9: Safety Equipment.....	26
	item No.20: Metering Equipment's.....	27
	ITEM No.21: CIVIL	27
	ITEM NO. 22.1: Land Preparation.....	27
	Item No.22.1.1: Land Leveling and Compacting.....	27
	ITEM No.22.2: Boundary Wall.....	27
	ITEM No. 22.3: Drainage.....	28
	Item No.22.3.1: Land Drainage including Rainwater harvesting.....	28
	Item No.22.3.2: Transformer Drainage and baffle walls.....	28

ITEM No.22.4: Road.....	28
Item No.22.4.1: Access Road	28
Item No.22.4.2: Rail-Cum-Road	28
Item No.22.4.3: RCC Road.....	28
ITEM No.22.5: Earthing.....	29
ITEM No.22.6: GIS, AMS & Control Room Building Item	29
ITEM No.22.6.1: RSS Design AS PER OEM Equipment.....	29
ITEM No.22.7: Building Construction.....	29
ITEM No.22.8: Facilities Installations.....	29
ITEM NO.: 22.8.1 &22.8.2	29
ITEM No.22.90: Guard Room.....	30
ITEM No.22.10: Signages.....	30
ITEM No.22.11: Cable Trenches and Cable trough	30
ITEM No.22.12: Foundations.....	30
item No.22.13: Testing and commissioning.....	30
item No.22.14: Storage Space	31
item No.22.15: Landscaping and Plantation.....	31
item No.22.16: Yard fencing.....	31
item No.22.17: Oil tank for transformer.....	31
3 Bill No. B-3 G&SS.....	32
ITEM NO 23,24,25 &26: SUPPLY of Spares, Tools and Equipments.....	32
Item No.26.15: Training Of Employer's Staff.....	32
Item NO. 26.15.1 & 26.15.2.....	32
OFF-SHORE training & Training in India	32
Item No. 26.16: Substation support.....	32
Item No. 26.16.1: Maintenance & Operations manuals of RSS	32
Item No.26.16.2: Integrated testing & commissioning of RSS.....	33
Item No.26.16.3: As-Built drawings of RSS	33
Item 26.16.4: DELETED	33
item No. 26.7: Manning Supervision up to ROD of RSS.....	33

Explanatory Notes of RSS (Receiving Sub-Station) & HT Cabling BOQ

The item description is intended to briefly describe the work to be performed under that item and to identify associated work. It may not be considered as a full and complete description of the work to be performed. The Contractor shall carry out all the work necessary to meet the requirements of the Specification and make the system fully functional to suit its purpose.

1 BILL NO. B1. HVC-S & HVC-E 220KV CABLE

ITEM No.1: The following Bills pertain to 'EHV Cabling Supply, Laying, Testing and Commissioning of 220kV EHV cables.

Explanatory Notes given hereunder are applicable to the corresponding items in the above Bills.

ITEM NO.1.1: SUPPLY, DELIVERY, TRANSPORTATION, LOADING AND UNLOADING OF 220kV, 1000 sSQ.MM, SINGLE CORE ALUMINUM CONDUCTOR EHV CABLE

The Price shall include the cost of Supply, delivery, transportation, loading and unloading of 220 kV EHV cables, as per specification and approved design. The prices of Straight through Joints and terminations shall not be included in this item and the price shall also not include the cost of cable trenches / ducts, which are included in other items.

ITEM NO. 1.2: SUPPLY AND ISTALLATION OF 220kV, 1000SQ MM ALUMINIUM CABLE JOINTS.

The price shall cover the cost of supply and installation of a Straight through Joint of appropriate type and rating, as per specifications and approved design. The Joints shall be complete in all respects including, but not limited to

- conductor sleeve
- protection tubes
- insulating layer
- stress cone and epoxy unit (for pre-molded joints)

and shall be ready for erection. The price quoted shall be for each straight through joint for making Joint of single cable. The price shall include the cost of marking the joint, manpower support and other items requires to complete the job.

ITEM NO. 1.3: SUPPLY AND INSTALLATION OF 220Kv, 1000SQ MM ALUMINIUM CABLE TERMINATION (OUTDOOR TYPE)

The price shall include the cost of supply and installation of outdoor terminations of appropriate rating and type (pre-molded, heat- shrinkable or SF-6 Gas Immersed), as required, as per specifications. The terminations shall be complete in all respects and shall be ready for erection. The price quoted shall be for a single termination for making termination of each cable. The price shall including cast of marking the termination, manpower support and other items requires to

complete the job.

ITEM NO. 1.4: SUPPLY AND INSATALLATION OF 220kV, 1000SQ MM CABLE TERMINATION (GIS MALE TYPE & GIS FEMALE TYPE TO BE FIXED IN INSIDW THE GIS)

The price shall include the cost of supply and installation of terminations of appropriate rating and type (pre-molded, heat-shrinkable or SF-6 Gas Immersed), as required, as per specifications.

The terminations shall be complete in all respects including but not limited to

- connecting rod
- bushing (Epoxy for SF-6 Gas Immersed female and male bushings)
- insulation
- stress cone
- supporting pipe / insulator
- protection tube
- plumb

and shall be ready for erection. The price quoted shall be for a single termination for making termination of each cable. The price shall include the cost of marking termination, manpower support and other items requires to complete the job.

ITEM NO. 1.5: SUPPLY AND INSTALLATION OF THREE PHASE OF LINK BOX WITH SVL.

The price shall include the cost of supply and installation of three phase cross bonding Link box with SVL including 400 Sq mm sheath bonding cable and 400/400 Sq mm co-axial cable required for providing Bonding of appropriate type (single, midpoint or cross) covering all 3- cables/phases as per approved design suitable for 220 kV, 1200/1000 Sq mm UG Cable.

The Link box shall be buried type, waterproof (capable of immersion in water), weatherproof, rust & dust proof (IP: 68).

ITEM NO. 1.6: SUPPLY AND INSTALLATION OF THREE PHASE OF LINK BOX WITHOUT SVL.

The price shall include the cost of supply of three phase

Link box without SVL including

400 Sq mm sheath bonding cable and 400/400 Sq mm co-axial cable) required for providing Bonding of appropriate type (single, midpoint or cross) covering all 3- cables/phases as per approved design suitable for 220 kV, 1200/1000 Sq mm UG Cable.

The Link box shall be buried type, waterproof (capable of immersion in water), weatherproof, rust & dust proof (IP: 68)

ITEM NO. 1.7: SUPPLY OF OFC CABLE

The Price shall include the cost of Supply of OFC cables with armoring as per approved and used in

other telecom utilities and should be of reputed make. The price shall be quoted per meter of cable.

The prices of Joints and terminations and converter devices shall be included in this item and the price shall not include the cost of cable trenches / ducts, which are included in other items. Two runs of OFC cables are to be laid from source substation to RSS.

ITEM NO.2: ERECTION, TESTING&COMMISSONING OF 220KV CABLING SYSTEM

ITEM NO.2.1: LAYING, TESTING&COMMISSIONING OF 220KV CABLE

DELETED

ITEM NO.2.2: HANDLING AND MAKING OF STRIGHT THROUGH JOINTS

DELETED

ITEM NO.2.3: HANDLING AND MAKING OF OUTDOOR TERMINATION

DELETED

ITEM NO.2.4: HANDLING AND MAKING OF CABLE TERMINATION

DELETED

ITEM NO.2.5: SUPPLY AND INSTALLATION OF LINK BOXES CHAMBERS

The price shall be including the cost of supply, erection, testing and commissioning of three phase earth link box at joint bay with connecting earth leads, all lugs, fixtures, clamps bolt and nut complete (for straight/ cross bonds) with all consumables and services at site etc. to complete the job with/without SVL as per specification and approved design.

ITEM NO.2.6: ERECTION OF THREE PHASE EARTH LINK BOX

DELETED

ITEM NO.2.7: LAYING OF PILOT WIRE CABLE

laying of pilot wire cable/FO Cable armoured indoor /outdoor for communication as per specification and approved design including jointing splicing, terminations etc.

ITEM NO.3: CABLE LAYING, TESTING AND COMMISSIONING

ITEM NO.3.1: 220KV CABLE LAYING, THROUGH TRENCHLES, LAYING ON UNDERGROUND, IN PIPES/DUCTS INCLUDING CABLE RUTE SURVEY (4.5KM).

ITEM NO.3.1.1: DETAIL ROUTE SURVEY

The Price shall cover the cost of surveying the route between the Power Supply Authority's GSS end and the Receiving Substation including possible alternative routes. The price shall also include the cost of preparation of a 'Route Plan Drawing' for each possible alternative routes, showing in each alternative among other details, the lengths of laying to be done under different categories such as:

- Laid directly in Ground
- Laid directly in ground, below footpath
- Laid directly in ground, below road
- Laid in underground ducts for road crossing etc
- Laid in trenchless Piping
- Laid in abutment crossing with suitable bridges for nallah crossing etc
- Laid in Rail track crossing piers/walls, for nallah-crossing etc
- Laid in Air, supported on in already existing structures
- Laid by Push Pull Method
- Laid on Metro Via-Duct

When cables are laid in air, supported on piers/walls, they shall be provided with suitable protective covering.

The Drawings, prepared in sufficient details to make a reasonably correct assessment of the work involved, shall be submitted for each section separately.

The Contractor shall survey at least 3 routes for cable laying from KPTCL supply authority Grid Sub Station to BSTP Metro Receiving Sub-Station and evaluate to arrive at the most suitable, feasible, economical, shortest route and submit the same with full details including underground utilities for the approval of engineer. The Contractor shall also furnish the design including layout plan location of trenches, road crossing, rail crossing, nallah crossing, push pull method, via-duct of Bi-RIDE and other crossings and crossing the utilities and pipe line etc. before starting the work. The Contractor shall also prepare the drawings, documents as described in the various sections sub section as specified in the General Specification and Particular Specification. The Contractor shall produce drawings for approval of Engineer and those required for construction works at site and carry out the modifications suggested by the employer. The review shall also ensure uniform systems for all the Receiving Sub-Station and checking the calculation of cable sizing, de-rating factors as per the site conditions, checking the cable laying methods and review to meet the performance standards. This will also include calculations sheets and justifications for any design changes and improvements to the satisfaction and convincing the engineer.

This will also include payment of requisite fees for obtaining permission for cable laying from city agency/statutory bodies fees for estimation, deposits and cost for reconstruction works, for all lands including road restoration costs on account of protection /diversion/handling of utilities, any other claim/damages to be paid in the course of work. This also includes cost of barricades for protection of work, deployment of traffic marshals and traffic diversion works. Fees deposited by the contractor to Government Agencies for obtaining permission for laying of EHV cables shall be reimbursed by Bi-RIDE on submission of documentary evidence of payment. Only road restoration charges paid by the contractor to the civic agencies will be reimbursed by Bi-RIDE on submission of documentary evidence of payment. If for some stretch, road restoration is to be done by the contractor, the price quoted in the BOQ shall be payable.

ITEM NO.3.2: MAKING OF CABLE PATH (3.2.1 TO 3.2.14)

The price shall cover the cost of excavation, backfilling, leveling, supply and laying of warning tape, PLB duct in open trench, supply and spreading of fine sand, supplying and laying of RCC cable covering tiles, laying of HDPE by trenchless method, cable pulling by motorized method, supply of cement concrete as per site requirement, supply and installation of route markers/joint markers, bonding cable, supply and providing GI steel, earthing material for jointing bay, cable locking belt and associated accessories as per item no 3.2.1 to 3.2.14, and completion of the job in all respects as per technical specifications and approved design.

The price shall also cover the cost of laying of EHV cable and other cable to be done under different categories such as:

- Laid directly in ground.
- Laid directly in ground, below footpath.
- Laid directly in ground, below the road.
- Laid in underground duct for road crossing etc.
- Laid trenchless piping.
- Laid in abutment crossing with suitable bridges for nallah crossing etc.
- Laid in Rail track crossing pier/walls, for nallah -crossing etc.
- Laid in Air, supported on already existing structures.
- Laid by push pull method.
- Laid on metro Via-Duct.

When cables are laid in air, supported on piers/wall, they shall be provided with suitable protective covering and all the services at site etc. to complete this job in all respects

ITEM NO.3.4: TESTING AND COMMISSIONING

The Price shall include the cost of testing and commissioning, as per Employer's Requirements, of the entire EHV Cabling system.

The cost of testing and commissioning shall comply with Employer's requirement and cover:

- Wages and compensations
- Precaution to avoid damage to existing buildings, structures, services and utilities,
- Temporary works (traffic, access, water, electricity, soils, supply management)
- Erecting materials (screw, bolts)
- The cost of complying with the employer's requirement.
- The Tenderer shall complete and submit all bill sheets endorsed by the signature of his representative.

ITEM NO.4: 33KV CABLE**ITEM NO.4.1,4.2&4.3: 33KV CABLE SUPPLY, ERECTION, TESTING AND COMMISSIONING.**

The Price shall include the cost of Supply, erection, testing and commissioning of 33 kV HV cables from transformer secondary to 33kv SWGR as per specification and approved design.

ITEM NO.5: 25KV AND 3.3KV CABLE ITEM**NO.5.1: 25KV CABLE SUPPLY****DELETED****ITEM NO.5.2: 25KV CABLE ERECTION AND COMMISSIONING.****DELTED****ITEM NO.5.3: 25KV CABLE TERMINATION KIT**

The Price shall include the cost of supply, erection, testing and commissioning of 25 kV cables terminations from transformer secondary to 25kV SWGR as per specification and approved design.

ITEM NO.5.4: 3.3KV CABLE SUPPLY**DELETED****ITEM NO.5.5: 3.3KV CABLE****DELETED****ITEM NO.5.6: 3.3KV CABLE TERMINATION**

The Price shall include the cost of supply, erection, testing and commissioning of 3.3kV cables from transformer secondary to buried rail/ Return current marshaling box.

ITEM NO.5.7: 25kV CABLE SUPPLY (630 sq.mm Cu)

The price shall include the cast of supply of 25kV HV cable from transformer secondary to 25kV SWGR as per specification and approved design

ITEM NO.5.8: 25kV (630 sq.mm Cu) CABLE ERECTION AND COMMISIONING.

The price shall include the cast of erection, testing and commissioning of 25kV HV cable from transformer secondary to 25kV SWGR as per specification and approved design

ITEM NO.5.9: 3.3kV CABLE SUPPLY

The price shall include the cast of supply of 3.3kV cable from transformer secondary to buried rail/ Return current marshaling box.

ITEM NO.5.10: 3.3kV CABLE ERECTION AND COMMISIONING

The price shall include the cast of erection, testing and commissioning of 3.3kV cable from transformer secondary to buried rail/ Return current marshaling box.

2 BILL NO. B2. GIS-S-GIS-E 220KV RSS**ITEM NO.6: 220 KV GIS SWITCHGEAR****ITEM NO.6.1: 220 KV GIS INCOMING BAYS**

The price shall include the cost of supplying each 220 kV GIS incoming bay, as per Employer's requirements and drawings, mainly consisting of

- Circuit Breaker— 1 No.
- Current Transformer— 1 No
- Maintenance Earth Switch — 1 No.
- Line Disconnecter— 1 No.
- Line Earth Switch (Fast acting) – 1 No
- Voltage Transformer with integrated isolation devices suitable for high voltage DC testing of cables.
- Indoor lightning arrester- 3 no. one per phase (for each Incomer)
- Bus Disconnecter Switch — 2 Nos.
- Bus end Maintenance Earth Switch — 1 No.

Including any other items as required for connection to the two bus bars, 220 kV incoming cables through lightning arrester and for completing the intent of work.

ITEM 6.2: 220KV TRACTION TRANSFORMER FEEDING BAY

The price shall include the cost of supplying each 220kV GIS outgoing bay, as per Employer's requirements and drawings, mainly consisting of

- Circuit Breaker— 1 No.
- Current Transformer— 1 set.
- Maintenance Earth Switch (Transformer Side) – 1 No
- Bus side Earth Switch (Bus Side) — 1 No.
- Bus Disconnectors — 2 Nos.
- Indoor lightning arrester – 1 set

Including any other items as required for connection to bus bars, cables etc. and for completing the intent of work.

ITEM 6.3: 220KV AUXILIARY TRANSFORMER FEEDING BAY

The price shall include the cost of supplying each 220kV GIS outgoing bay, as per Employer's requirements and drawings, mainly consisting of

- Circuit Breaker— 1 No.
- Current Transformer— 1 set.
- Maintenance Earth Switch (Transformer Side) – 1 No
- Bus side Earth Switch (Bus Side) — 1 No.
- Bus Disconnectors — 2 Nos.

- Indoor lightning arrestor – 1 set

Including any other items as required for connection to bus bars, cables etc. and for completing the intent of work.

ITEM 6.4: 220 KV GIS COUPLING BAY

The price shall include the cost of supplying 220kV GIS coupling bay, as per Employer's requirements and drawings, mainly consisting of

- Circuit Breaker— 1 No.
- Current Transformer— 2 Nos.
- Bus Disconnectors & Earth Switch — 2 Nos.

Including any other items as required for connection to bus bars, cables etc. and for completing the intent of work

ITEM 6.5: BUS VT MODULES AND BUS BARS AND OTHER ITEMS AS PER SPECIFICATIONS.

- Voltage Transformer — 2 No.
- Bus Disconnectors & Earth Switch — 2 Nos.

One additional set of all type of operating handles of all equipment of 220 kV GIS to be provided.

ITEM NO 7: 220KV GIS ERECTION, TESTING AND COMMISSIONING

Item 7.1, 7.2, 7.3, 7.4: Erection, Testing and Commissioning of 220kV GIS

This bill includes cost of erection and commissioning of entire 220kv Switch gear as per technical specifications and approved design.

ITEM NO 8: LIGHTING CUM LIGHTENING MAST

Item 8.1: Supply support structure for mounting equipment and Lightning mast with complete hardware as per specification and approved design.

Item 8.2: Erection including testing and commissioning of support structure for mounting equipment and Lightning mast with complete hardware as per specification and approved drawings.

ITEM NO 9: CONTROL AND PROTECTION PANEL FOR 220KV GIS ITEM NO. 9.1

INCOMER BAYS

This bill includes the design supply of the Control and Protection Cubicle for the Incomer Bays, shall contain the Bay Control Intelligent Electronic Devices (IED) for Control and Monitoring, and Bay Protection Intelligent Electronic Devices (IED) for Protection, as per specification. The cubicle shall contain all necessary devices, including, but not limited to, the required direct connections to the Ethernet Interbay LAN as per specifications.

ITEM NO. 9.2: OUTGOING BAYS FOR AT BAYS

This bill includes the design, supply of the Control and Protection Cubicle, for the Outgoing Bays for Auxiliary Main Transformers, shall contain the Bay Control Intelligent Electronic Devices (IED) for Control and Monitoring, and Bay Protection Intelligent Electronic Devices (IED) for Protection, as per specification. The cubicle shall contain all necessary devices, including, but not limited to, the required direct connections to the Ethernet Inter Bay LAN as per specifications.

ITEM NO. 9.3: OUTGOING BAYS FOR TT BAYS

This bill includes the design, supply of the Control and Protection Cubicle for the Outgoing Bays for Traction Transformer, shall contain the Bay Control Intelligent Electronic Devices (IED) for Control and Monitoring, and Bay Protection Intelligent Electronic Devices (IED) for Protection, as per specification. The cubicle shall contain all necessary devices, including, but not limited to, the required direct connections to the Ethernet Inter Bay LAN as per specification.

ITEM NO. 9.4: BUS COUPLER CIRCUIT

This bill includes the design, supply of the Control and Protection Cubicle, for the Outgoing Bays for Bus Coupler Circuit, shall contain the Bay Control Intelligent Electronic Devices (IED) for Control and Monitoring, and Bay Protection Intelligent Electronic Devices (IED) for Protection, as per specification. The cubicle shall contain all necessary devices, including, but not limited to, the required direct connections to the Ethernet Inter Bay LAN as per specification.

ITEM NO. 9.5: FOR BUS BAR PROTECTION

This bill includes the design, supply of the Control and Protection Cubicle, for the Outgoing Bays for Bus bar Protection System, shall contain the Bay Control Intelligent Electronic Devices (IED) for Control and Monitoring, and Bay Protection Intelligent Electronic Devices (IED) for Protection, as per specification. The cubicle shall contain all necessary devices, including, but not limited to, the required direct connections to the Ethernet Inter Bay LAN as per specification.

Item No. 9.6 to 9.10: Erection, testing and commissioning of complete 25kv control and protection panel as per technical specifications and approved design.

ITEM NO.10: SAS SYSTEM**ITEM NO.10.1: SERVER EQUIPMENTS**

The price shall include the cost of supplying the workstations needed as man machine interface for the control, monitoring, and supervision of all electrical installations included in the Scope of Work, from the Control room of the RSS concerned.

The price shall essentially include, but not limited to, the following:

- Two SAS Application cum Database Servers (one main & one standby) State of Art RAID5/ RAID1 Servers with mounting arrangement.
- DRPC- 1 Nos
- Workstation with dual monitor
- Basic Software (OS, All Drivers, MS office etc.) with DR functionality and relay configuration software.
- Antivirus software with 5 years of license subscription from the date of commissioning.

- Any other components/accessories required for completion of the works.
 - Antivirus software with 5 years of license subscription from the date of commissioning
 - Specific Programs/Software – 1 Set
 - Terminal- 1 Nos
 - Keyboard and mouse- 2 set
 - 32-inch LED Monitor as per specifications.
 - Installation of DR workstation and Powering-up Installation of all Software, updates & patches
 - Network Connectivity & configuration/setup
 - Testing & commissioning of above equipment's.

ITEM NO.10.2: GATEWAY

The price shall include the cost of providing the necessary Communication interface (Gateway) between the Substation Automation System (SAS) and the remote operation control centres. The Communication interface shall be Ethernet compliant and support simultaneous communication with multiple remote Operation Control Centres. Bidders are required to interface with SCADA contractor for compliant protocols.

ITEM NO.10.3: CONVERTER

The price shall include the cost of supplying the equipment needed as an interface between the fiber optical network and the cat5 copper wiring for control, monitoring equipment in RSS. The price shall also include all accessories required.

ITEM NO.10.4: PRINTERS

The price shall include the cost of supplying the required set of printers, each set consisting of one each of all types, as per specifications, at the RSS. The price shall essentially include, but not limited to, the following:

- The printers (ready to print)
- Their support

ITEM NO.10.5: STORAGE, DESK AND CHAIRS

The price shall include the cost of supplying the Storage, desk and chairs, as per specifications at the RSS. The price shall essentially include, but not limited to, the following:

- The storage almirah -2 nos.
- The desk and set of drawers – 2nos.
- The rollers chair - 5 nos.

The Contractor will have to interface with other contractors and the employer's representative, for the design verification and materials to be used.

ITEM NO.11: UPS/INVERTER

ITEM NO.11.1&11.2: 415 V, 3-PHASE, 5 KVA UPS WITH BATTERY

The price shall include the cost of design, supply, erection, testing and commissioning of 415 V UPS of suitable rating with battery, as per specification for power supply to the SAS and emergency lighting.

ITEM NO.12: CONTROL WIRING AND CABLE TRAYS**ITEM NO.12.1&12.2: LV CONTROL CABLES**

The price shall include the cost of supplying, laying, testing and commissioning of all LV cables and control cables required inside the RSS premises, which are not otherwise included in the internal wiring of equipment, control cubicles, panels etc, to ensure all necessary connections between the relevant equipment, control cubicles, panels etc, to make the RSS complete and capable of being successfully commissioned and operated.

ITEM NO.12.3: CABLES TRAYS

Supply, erection of hot dip galvanized steel cable trays/raceways/ladders including suspending rods and associated fittings for completion of job.

ITEM NO.13: T-1 TRACTION SUBSTATION**Item No.13.1: Traction Transformer Item****No.13.1.1**

The price shall cover design, manufacture and supply of 220 kV/27.5 kV single phase traction transformer with OLTC and NIFPS as per specifications and drawings complete in all respects. The price shall include the cost of first filling of oil and also adequate quantity of spare oil for topping up etc. during commissioning. The price shall also include the cost of supplying:

- Mounting rails and oil retaining materials and equipment
- Current transformers for tank protection
- Bushing current transformers
- And all accessories required for the proper functioning of the transformer
- RTCC Panel of Traction Transformer.
- NIFPS system for Traction Transformer

Item No.13.1.2

Erection, testing and commissioning of above item (13.1.1) as per technical specification and approved drawing and any other item required for commissioning of transformer.

Item No.13.1.3

Supply and installation of fittings and other components for the primary side of the power transformer, ensuring completion in accordance with specifications and drawings, including PI, clamp and connector fixing.

Item No.13.1.4

Erection, Testing & commissioning of Fittings & other components primary side for completion of Power Transformer ensuring completion in accordance with specifications and drawings, including PI, clamp and connector fixing clamps/connector etc.

Item No.13.1.5

Supply Fittings & other components for secondary side of Power Transformer ensuring completion in accordance with specifications and drawings Including PI, Fixing of Clamps/connector etc.

Item No.13.1.6

Erection, Testing & commissioning Fittings & other components secondary side for completion of Power Transformer as per specifications and drawings (Including PI, Fixing of Clamps/connector etc.,)

Item No.13.1.7

Supply, Erection, testing and commissioning of 3"x80mm and 90mm O.D IPS Al. tube with associated connectors and any other material to make the job complete including cutting and bending etc as per technical specification and approved design.

Item No.13.1.8

Supply, Erection, Testing and commissioning of steel structure including the tubular pole structure cable bracket etc as per technical specification and approved design.

Item No.14: 25 kV SWITCHGEAR**ITEM NO.14.1&14.5: 25 KV GIS INCOMING BAYS**

The price shall include the cost of supplying, erection, testing and commissioning of each 25kV single phase GIS incoming Bay, as per Employer's requirements and drawings, including, but not limited to, the following:

- Circuit Breaker— 1 No.
- Current Transformer— 1 No.
- Disconnecter with Earth Switch – 1 No.
- Voltage Transformer – 1 No.
- Indoor lightning arrester – 1 No, with surge arrester counter on GIS having SCADA communicability on IEC 61850 protocol. They shall also indicate the value of leakage current.

Including any other items as required for connection to the bus bars, 25 kV incoming cables through lightning arrester and for completing the intent of work

ITEM NO.14.2&14.6: 25 KV OUTGOING BAY

The price shall include the cost of supplying, erection, testing and commissioning of each 25kV single phase GIS outgoing bay, as per Employer's requirements and drawings, mainly consisting of

- Circuit Breaker— 1 No.
- Current Transformer— 1 No.
- Disconnecter with Earth Switch – 1 No.
- Voltage Transformer – 1 No.
- Indoor lightning arrester – 1 No, with surge arrester counter on GIS having SCADA communicability on IEC 61850 protocol. They shall also indicate the value of leakage current.

Including any other items as required for connection to bus bars, cables etc. and for completing the intent of work

ITEM NO.14.3&14.7: 25 KV GIS COUPLING BAY

The price shall include the cost of supplying, erection, testing and commissioning of 25 kV single phase GIS coupling bay, as per Employer's requirements and drawings, mainly consisting of

- Circuit Breaker— 1 No.
- Current Transformer— 1 no (2 core)
- Bus Disconnectors & Earth Switch — 2 Nos.

Including any other items as required for connection to bus bars, cables etc. and for completing the intent of work.

ITEM NO.14.4&14.8: 25 KV GIS BUS VT MODULES AND BUS BAR AND OTHER ITEMS AS PER SPECIFICATIONS.

- BUS VT – 2 Sets
- One additional set of all type of operating handles of all equipment of 25 kV GIS to be provided.

ITEM NO 15: 25KV CONTROL AND PROTECTION PANEL ITEM NO.15.1&15.4: CRP FOR INCOMING FEEDER

The price shall include the cost of supply, erection, testing and commissioning of the Bay Control Unit, IED, Protection relay etc. needed for the control, monitoring, protection and automatic sequences of the 25 kV TSS installations.

- All meters (other than Energy meters), relay and interface equipment for achieving the metering and protection arrangement for traction substation specified in the tender document
- Control and relay panel
- Interfaces with Substation Automation System equipment

The Tenderer shall ensure that all equipment, meters, relays and interface equipment for achieving the metering and protection arrangement specified in the tender document, are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.

2.1 ITEM NO.15.2&15.5: CRP FOR OUTGOING FEEDER

The price shall include the cost of supply, erection, testing and commissioning of the Bay Control Unit, IED, Protection relay etc. needed for the control, monitoring, protection and automatic sequences of the 25 kV TSS installations.

- All meters (other than Energy meters), relay and interface equipment for achieving the metering and protection arrangement for traction substation specified in the tender document
- Control and relay panel
- Interfaces with Substation Automation System equipment

The Tenderer shall ensure that all equipment, meters, relays and interface equipment for achieving the metering and protection arrangement specified in the tender document, are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.

2.2 ITEM NO.15.3&15.6: CRP FOR BUS COUPLER FEEDER

The price shall include the cost of supply, erection, testing and commissioning of the Bay Control Unit, IED, Protection relay etc. needed for the control, monitoring, protection and automatic sequences of the 25 kV TSS installations.

- All meters (other than Energy meters), relay and interface equipment for achieving the metering and protection arrangement for traction substation specified in the tender document
- Control and relay panel
- Interfaces with Substation Automation System equipment

The Tenderer shall ensure that all equipment, meters, relays and interface equipment for achieving the metering and protection arrangement specified in the tender document, are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.

ITEM NO.15.7: EARTHING & RETURN CURRENT EQUIPMENT/ BURIED RAIL

The price shall cover the cost of providing the necessary arrangement for connection of one end of the secondary winding of the traction transformer to earth through Return Current Marshaling box with copper strip and CTs, as per Employer's requirements and drawing.

The price shall essentially include but not limited to the following

1. Insulated cable of adequate current carrying capacity to connect the secondary terminal of the traction transformers to the connecting strip / buried rail.
2. Return current Marshaling box with copper strip (with provision of CTs to monitor return current).
3. Bare cable of adequate current carrying capacity to connect the connecting strip or the buried rail to the earth mesh.
4. This will also include equipment earthing & other earth connections of structures and equipment in RSS & TSS to the main substation earthing grid and any other works

relating to earthing.

ITEM NO.16: A1- AUXILIARY MAIN SUB-STATION ITEM

NO.16.1.: AUXILIARY TRANSFORMER

ITEM NO.16.1.1&16.1.7:

The price shall cover the cost of supply, erection, testing and commissioning of 220 kV / 33 kV, three phase auxiliary main transformer with OLTC, NIFPS as per specification, complete in all respects. The price shall include the cost of first filling of oil and also adequate quantity of spare oil for topping up etc. during commissioning. The price shall also include the cost of supplying.

- Mounting rails and oil retaining materials and equipment
- Current transformer for tank protection
- Transformer cooling and auxiliaries
- Bushing current transformers
- Accessories required for the proper functioning of the transformer.
- RTCC panel and all auxiliaries.

ITEM NO.16.1.2 & 16.1.8: PRIMARY NEURAL ISOLATOR

Supply and erection of Primary Neutral Lightning Arrester including necessary terminals connectors as per for completion of the job as per specification.

ITEM NO.16.1.3 & 16.1.9: PRIMARY NEUTRAL CURRENT TRANSFORMER

Supply, erection, testing and commissioning of primary Neutral Current Transformer including necessary connector for completing the job as per specifications.

ITEM NO.16.1.4 & 16.1.10: PRIMARY NEUTRAL LIGHTNING ARRESTER

Supply, erection, testing and commissioning of primary Neutral Current Transformer including necessary connector for completing the job as per specifications.

ITEM NO.16.1.5 & 16.1.11: NEUTRAL GROUNDING RESISTER

Supply, erection, testing and commissioning of 24kV, 50Hz, 20 Ohm Secondary Neutral Grounding Resistor including Compact Switching Unit comprising of 2 SNCT, 1 SNLA, 1 SN ISOLATOR mounted in a Cubicle.

ITEM NO.16.1.6 & 16.1.12: FITTING AND OTHER COMPONENTS

Supply, erection, testing and commissioning of including necessary connector for completing the job as per specifications.

ITEM NO.17: 33KV PANEL**ITEM NO.17.1: 33KV INCOMING PANEL**

The price shall include the cost of supplying one 33 kV, 3 pole circuit breakers and Surge arrestors as per specifications, for indoor installation inside the AMS Room, complete in all respects. The price for supply of potential and current transformers, protection relays and measuring instruments, as per specifications, shall not be included against this item, and shall be included in Item 2.4 below. However, no separate panel shall be required for control and protection IEDs. The price shall also include, grouting as required.

ITEM NO.17.2: OUTGOING CIRCUIT BREAKER

The price shall include the cost of supplying one 33 KV, 3 pole, circuit breaker and surge arrestors as per specifications, complete in all respects for indoor installation inside the AMS Room. The price for supply of potential and current transformers, protection relays and measuring instruments, as per specifications, shall not be included against this item, and shall be included in Item 2.4 below. However, no separate panel shall be required for control and protection IEDs.

The price shall also cover the cost of padlocks/interlocks to be provided on these breakers in accordance with specification.

ITEM NO.17.3: COUPLING CIRCUIT BREAKER.

The price shall include the cost of supplying one 33 kV, 3 pole Bus coupler circuit breakers, as per specification, complete in all respects. The price shall also include bus riser.

One additional set of all type of operating handles of all equipment of 33 kV Switchgears to be provided.

ITEM NO.17.4: MEASURING AND PROTECTION EQUIPMENT

Under this item, the price of supplying all equipment including all current and potential transformers (1 number of 3 phase in each circuit breaker) control and relay boards along with necessary control switches, indications, relay and meters and all associated components, terminals and fittings, shall be included. The price shall essentially include, but not limited to, the following

Control and relay panel

Primary neutral current transformers for auxiliary main transformers along with structures to support them, as per employer's requirement

Secondary neutral current transformers for aux. Main transformers along with structures to support them, as per employer's requirement

Interfaces with Substation Automation System and 'Gateway' to OCC.

The Tenderer shall ensure that all equipment, meters, relays and interface equipment for achieving the metering and protection arrangement specified in the tender document, are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.

ITEM NO.17.5: CONTROL AND MONITORING EQUIPMENT (IED)

The price shall include the cost of supplying the Programmable Logic Controllers, needed for the control, monitoring, protection and automatic sequences of the 33 kV and low voltage of AMS installations. The price shall essentially include, but not limited to, the following:

IED holding panels

IED and the requested modules and cards and their connections Program input

ITEM NO.17.6: ERECTION, TESTING AND COMMISSIONING OF 33KV SWITCHGEAR.

Erection, Testing and Commissioning of 33kV Switchgear panel in AMS building consist of above items (17.1 to 17.5) and other measuring and protection equipments, including fixing of base frame, inter connection of cubicles, fixing of busbar and all loose supplied items, inter panel wiring etc.

**ITEM NO.18: 33/0.415 KV, 200KVA AUXILIARY TRANSFORMER ITEM
NO.18.1&18.2: 200KVA AUXILIARY TRANSFORMER**

The price shall cover the cost of supply, erection, testing and commissioning of 33 kV / 415V, 200kVA, cast resin type transformer, according to specifications, complete with all accessories. The price shall also include the cost of necessary arrangements for installing enclosure, complete with doors and mechanical interlocks and fire protection systems etc.

ITEM NO.19: AUXILIARIES**ITEM NO.19.1&19.2: BATTERY CHARGERS**

The price shall cover the cost of supplying, erection, testing and commissioning of one set of battery chargers, one set comprising of in all 3 Battery Chargers, 2nos. battery chargers each acting as a back-up to the other and a third battery charger acting as a standby to any of the normal battery chargers. Battery charger equipment shall include inlet transformer, Silicon diode / Thyristor or Thyristor bridge all protection systems, monitoring and measuring device, control devices, inspection lights etc.

ITEM NO.19.3&19.4: BATTERIES

The price shall cover the cost of supply, erection, testing and commissioning of one set of batteries comprising of two nos. of 110 V battery banks (one bank 85 cells), complete with mounting rack, battery protection and connections. Each battery of the set shall be rated to ensure total autonomy of the Substation, for 8 hours and the rating shall not be less than 450 AH in any case.

ITEM NO.19.5&19.6: 415V AC DISTRIBUTION BOARD

The price shall cover the cost of supplying, erection, testing and commissioning of an AC (415V) Distribution board inside the AMS, as per specifications, including, but not limited to, the following:

- 3 Specific cabinets, each containing a Master Circuit Breaker
- Copper Bus bar (4-pole), 1000A - - Protection Circuit Breakers
- Outgoing feeders with MCB's

The price shall also include the cost of necessary locks, interlocks and automatic change- over arrangement both for the Incomer Circuit Breakers and the standby battery charger set.

ITEM NO.19.7&19.8: DC DISTRIBUTION BOARD

The price shall cover the cost of supplying a DC (110V) Distribution board inside the AMS, as per specifications, including, but not limited to, the following:

2 Specific cabinets, each containing a Master power supply Circuit Breakers, isolating switch, non-return diodes and set of normal/standby supply bars, current and voltage protection relays etc.

Automatic and normal device for change-over Outgoing feeders.

ITEM NO.19.9: SAFETY EQUIPMENT

The price shall cover the cost of supplying all safety equipment, as per specifications/ statutory regulations, in the AMS room for the entire RSS-cum-TSS-cum-AMS compound.

The indicative list of safety equipment to be provided is as follows: -

- Caution and Warning Notices
- Shock treatment charts
- Artificial respirator
- First Aid charts and First Aid Boxes
- Tool Board with Safety tools
- Lockable Keyboard

Fire detection and alarm system for the AMS is required to be included under the Civil Works Bill and shall not be included in this item.

ITEM NO.20: METERING EQUIPMENTS**Item No: 20.1, 20.2,20.3 & 20.4**

The price shall include the cost of supplying the necessary metering equipment, at the RSS, in accordance with specifications. The metering system shall also facilitate energy cost computation in availability-based tariff regime, which may be applicable in future. The prices of Energy meters on the Incoming Feeders, from the Power Supply Authorities, on the Traction Transformers output side and on the Auxiliary Main Transformers output side, Traction depot feeders shall be included against the respective sub-item under this item. The prices of the respective ammeters, voltmeters shall not be included in this item and shall be included in the respective Bay Control Cubicle /Control and Relay Panels.

ITEM NO.21: CIVIL

In order to achieve the complete (turnkey) job mentioned above, the tenderer shall include in his bid the design, supply, erection, testing and commissioning, final take-over, guarantee, delivery of as-built documents of the following, but not limited to, Civil work & Ancillary installations required by the Power Supply installations.

ITEM NO. 22.1: LAND PREPARATION**ITEM NO.22.1.1: LAND LEVELING AND COMPACTING**

The price shall include the cost of:

Clearing the site of all encumbrances

Cutting/transporting trees, as absolutely necessary, with the approval of and in consultation with the Employer, strictly in accordance with local laws.

Leveling the site to a finished ground level, as approved by the Employer.

Compacting the ground, in accordance with standard engineering practices, and setting up of site facilities as per specifications.

All other associated land preparation works

The bidder is specifically advised to inspect the site of RSS-cum-TSS-cum-AMS, before bidding, to be fully aware of the works involved.

ITEM NO.22.2: BOUNDARY WALL

The price shall include the cost of constructing a boundary wall along the periphery of the RSS-cum-TSS-cum-AMS complex, together with appropriate gates for access of

- one for heavy trucks (24 feet):
- one for general purpose vehicle (18 feet) with motorized movement:

The boundary wall shall be constructed as per the design approved by the employer. The boundary wall shall have proper foundations (piles or footing or raft) based on the soil investigation report of the location.

The boundary wall panels shall be of pre-casted or cast-in-situ RCC blocks of at least 3.0m high from finished level of RSS having Bi-RIDE logo on outer-face and provided with barbed wired etc., on the top over a height of approximately 0.5m, above 3.0m. Finishing of boundary wall shall be done as per Employer's requirements.

ITEM NO. 22.3: DRAINAGE**ITEM NO.22.3.1: LAND DRAINAGE INCLUDING RAINWATER HARVESTING.**

The price shall include the cost of preparation of designs for land drainage and rain water harvesting including drains, sump and, after their being approved by the Employer's representative, of executing the work in accordance with the best engineering practices, to ensure

proper drainage arrangements for rain water, waste water to recharge ground water through rain water harvesting system. The price shall also include cost of suitable electrically operated pumps in the sump/ rain water harvesting pit to feed the water into rain water harvesting systems.

ITEM NO.22.3.2: TRANSFORMER DRAINAGE AND BAFFLE WALLS

The price shall include the cost of preparation of designs for the baffle walls, oil retention tank and drainage arrangements for each transformer and, after their being approved by the Employer's Representative, of executing the work in accordance with best installation practices and according to specifications.

ITEM NO.22.4: ROAD

ITEM NO.22.4.1: ACCESS ROAD

The price under this item shall include the cost of strengthening/widening of an existing approach road and/or construction of an access road, to the Substation area, from the nearest existing road which has the necessary width and strength to permit movement of trucks/trailers, carrying power transformers and power supply equipment. The approach/access roads shall have a minimum length of 80m, width of 5.0m and a load carrying capacity to support 100-ton trailers. The radii of bends must be suitable for multiple-axle vehicles.

ITEM NO.22.4.2: RAIL-CUM-ROAD

The price under this item shall include the cost of strengthening/widening from RSS entry gate to Transformers for movement of trucks/trailers, carrying power transformers and power supply equipment. The rail-cum-road shall have a minimum length of 80m width of 5.0m and a load carrying capacity to support 100-ton trailers. The radii of bends must be suitable for multiple-axle vehicles.

ITEM NO.22.4.3: RCC ROAD

The price under this item shall include the cost other than the Access Road & Rail-Cum- Road of strengthening/widening of construction which has the necessary width and strength to permit movement of trucks/trailers, carrying power transformers and power supply equipment and shall have a minimum length of 80m, width of 5.0m and a load carrying capacity to support 100 tonne trailers. The radii of bends must be suitable for multiple-axle vehicles.

The price shall also include the cost of preparation of necessary designs and calculations, submitting them to the Employer's Representative, for approval. On approval of designs and calculation, the approach/access roads/rail-cum-road/RCC road shall be constructed as per approved designs.

ITEM NO.22.5: EARTHING

The prices shall cover the cost of carrying out the drawing/calculations, taking into account the electrical parameters at site (earth resistivity etc), and after they being approved by the Employer's Representative, of executing the work of laying the earth-mesh and earth risers, according to approved drawings and specifications and in accordance with standard engineering practices. This will include provision of separate earth electrodes for lightning masts, lightning arresters if required, transformer neutral earthing, separate earth electrodes for electronic devices, and earthing at all other points necessary for a safe practice. This will include the cost of soil treatment, providing of alternate layers of soil required for providing safe and acceptable earthing as per relevant practices codes and standards.

ITEM NO.22.6: GIS, AMS & CONTROL ROOM BUILDING ITEM**NO.22.6.1: RSS DESIGN AS PER OEM EQUIPMENT.**

The price shall include the cost of construction design by PST contractor for the GIS, AMS & Control Room Building (Civil and structural design) as per actual loading and sizing of equipment. Based on the actual room size designing of Lighting, Ventilation, air conditioning, equipment foundation, layout drawings, structural assembly drawings for out-door equipments, control protection scheme, relay setting coordination, control and power cable route layout shall be carried by respective OEM.

Any other design documents and drawings required for proper execution of work.

Contractor shall carryout geotechnical investigation and soil investigation before commencement of the design work for all RSS locations for Engineer / Employer approval.

The PST Contractor shall produce all of drawings, reports and calculations for approval of engineer/ employer.

ITEM NO.22.7: BUILDING CONSTRUCTION

The price shall include the cost of construction of the building all-inclusive of supply of all materials, as per the designs and drawings approved by the Employer's Representative, including electrical wiring, plumbing, thermal and moisture protection, doors and windows, finishing of wall, floors, ceiling etc.

ITEM NO.22.8: FACILITIES INSTALLATIONS ITEM NO.:**22.8.1 & 22.8.2**

The price shall include the cost of providing the various facilities in the AMS & Control Room Building, such as but not limited to light fittings & sockets, fans, VRF based air- conditioners, fire detection and alarm system, yard lighting, earth-mesh under the building and earth-risers, earthing inside the room, all facilities as described in specifications etc. This shall also include permanent provision of EOT crane in the GIS room for a capacity of not less than 5T capable of installing the GIS switchgear. This shall include cranes and lifting equipment wherever required for installation, testing and commissioning.

ITEM NO.22.90: GUARD ROOM

The prices shall cover the cost of preparing the design for the Guard room, 3.5 m x 3.5 m x 3.0 m and attached toilet room of size 1.5m x 1.2m having WC & basin and after their being approved by the Employer, the price of executing the works, including civil and structural works, lighting, ventilation with Air Coolers, plumbing and essential internal furnishings.

ITEM NO.22.10: SIGNAGES

The prices shall cover the cost of providing suitable Signages, including Sign boards at main gate visible from a distance of 1.6 km (in Hindi and English) and other relevant indicators, in accordance with drawings and details to be submitted by the Contractor and subject to approval by the Employer.

ITEM NO.22.11: CABLE TRENCHES AND CABLE TROUGH

The prices shall cover the cost of preparing the drawings, calculations, and after their approval by Employer's representative, the cost of installing all cable troughs, laid in ground, in the open

switchyard area of the RSS compound, including, but not limited to cable troughs in the High Voltage section. Transformer bays, feeding posts etc., starting from the entry point of HV cables from the BSTP, right up to the exit points from the RSS premises.

All trenches shall be covered with RCC covers (factory made pre-cast type only). All

cable troughs, laid inside the AMS and Control Rooms.

The cable troughs shall be provided with necessary cable supports/cable trays, cable raceways, cable ladder etc. of approved design to accommodate all 220 kV, 33 kV, 25 kV, 415 V and C&M cables, neatly and with adequate spacing between cables. Louvers of RCC with covers laid with angles.

Note:

1. Pre-cast cover slab with angles provided on the edges of slab for better strength and life shall be acceptable.
2. The provision of RCC type louver at few locations on cable trench (if any) will be finalized during detailed engineering stage.

ITEM NO.22.12: FOUNDATIONS

Installation of foundations, including materials, plain as well as reinforced concrete, for equipment structures towers, gantries etc.

Item No.: 22.12.1: 220/27.5 kV Traction transformer foundations,
Foundations along with materials of the entire 25 kV system of Traction Substation

Item No.: 22.12.1: 220/33 kV Auxiliary Main transformer foundations, Foundations along with materials of the entire Substation.

ITEM NO.22.13: TESTING AND COMMISSIONING

The price shall include the cost of testing and commissioning, as per employer's requirement of the entire civil work, ancillaries and facilities installations.

ITEM NO.22.14: STORAGE SPACE

The price shall include the construction and provision of covered storage space of approx. 150 sq. m in near RSS/depot with suitable rolling shutters, doors and other ancillaries and facilities as per the specifications as in chapter 8A of PS.

ITEM NO.22.15: LANDSCAPING AND PLANTATION

The price shall include provision of landscaping and plantation in RSS as per the specifications as in chapter 8A of PS.

ITEM NO.22.16: YARD FENCING

The price shall include provision of yard fencing to separate from equipment energized area to man movement in the RSS as per the specifications as in chapter 8A of PS.

ITEM NO.22.17: OIL TANK FOR TRANSFORMER

The price for the above item included in the item no 22.3.

3 BILL NO. B-3 G&SS**ITEM NO 23,24,25 &26: SUPPLY OF SPARES, TOOLS AND EQUIPMENTS**

The tenderer shall supply the consumable, DLP, Employers spares and Tools and equipment as mentioned in Annexure-I, Annexure-II, Annexure-III and Tools and Equipments of BOQ. The price shall include the handing over and transportation of Spares at designated place as informed by Bi-Ride. Gas filling kit – 1no, with all accessories shall be considered for each RSS.

ITEM NO.26.15: TRAINING OF EMPLOYER'S STAFF ITEM NO. 26.15.1 & 26.15.2**OFF-SHORE TRAINING & TRAINING IN INDIA**

This item shall cover the Training of Employer's staff as specified in the chapter 6 of PS of Employer's requirement.

- Man-weeks of contractor's Training Instructors for training Employer's personnel in India.
- Man-weeks of Employer's personnel for off-shore training at contractor's works / manufacturing facilities / training places.

It shall essentially include, but not limited to:

- Training plan
- Training tools and staff wages
- Training documentation

The price shall also include the cost of the training documents implementing as well as advises after the contract.

The price shall not include the travelling and accommodation cost of trainees.

ITEM NO. 26.16: SUBSTATION SUPPORT**ITEM NO. 26.16.1: MAINTENANCE & OPERATIONS MANUALS OF RSS**

This item shall cover the Maintenance & Operations manuals as specified in the chapter 11 of GS & chapter 6 of PS of Employer's requirement

One set of Manuals is meant to essentially include, but not limited Operation manuals

Maintenance manuals, drawings and procedures

The price shall also include the Maintenance & Operations documents implementing as well as documents originals, copies, and electronic files cost.

ITEM NO.26.16.2: INTEGRATED TESTING & COMMISSIONING OF RSS

These items shall cover the integrated testing & commissioning of RSS from OCC as specified in the chapter 4 of PS of Employer's requirement.

As explained in Chapter 4 of PS, the integrated testing and Commissioning shall be performed for RSS, after the first 15 days of operation, during which the various actuation and operation situations (putting into service, normal actuation, failure tripping etc.) shall be simulated.

The Integrated Testing & Commissioning shall essentially include, but not limited to:

- Integrated testing & commissioning plan
- Tools, instruments, tackles, and documents required;
- Providing attendance to the Employer's Representative, including during inspection by statutory Authorities, Ministry of Railways and Commissioner of Railway safety.
- Carrying out the appropriate integrated testing & commissioning functions.
- include such items and quantities in his bid and quote them in this very item.

ITEM NO.26.16.3: AS-BUILT DRAWINGS OF RSS

The price, under this item, shall include the cost of supplying As-Built drawings for RSS in 3 copies (hard copy and soft copy) included in this Bill as specified in the chapter 2 of PS of Employer's requirement.

Under this item, the contractor shall prepare the following drawings:

As built drawings depicting the completed works that have been certified as complete. Shop drawings containing information related to the permanent works.

Working drawings containing the information related to the temporary works depicting the construction of permanent works.

ITEM 26.16.4: DELETED**ITEM NO. 26.7: MANNING SUPERVISION UP TO ROD OF RSS****item No. 26.17.1 to 26.17.3**

This price shall include the cost of providing Security staff, Manning staff / Supervision staff for supervision of each RSS till the issuance of Taking Over Certificate from the date of commissioning. This price shall cover salaries, overtime, airfares, lodging allowances, their office expenditure, telephones/mobile bills, local travel costs to and from site, training materials, income tax and other taxes deducted at source.

Manning staff includes Skilled, Semi-skilled and security guard for each RSS.