

- 1F2 Control, Protection & Monitoring including BCU for three (3) sets of 230/132/33kV three phase, auto power transformer circuits.
- 1F3 Complete Control, Protection & Monitoring including BCU for bus coupler circuit.
- 1F4 Complete Busbar protection for 230kV systems.
- 1F5 Complete Independent standalone Digital Fault and Disturbance recorder (DFDR) with PMU functionality to monitor all 230kV bays, 132kV bays and 33kV incomer bays. Engineering workstation shall be supplied. DFDR should be integrated with central client station. The Engineering workstation PCs shall have minimum configuration of core i7 (latest generation), 16GB RAM, 1TB SSD with RAID1, and 27" display.
- 1F6 Complete Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVARh meters (accuracy class 0.2) for each 230 kV line and transformer feeder. For each feeder one meter shall be supplied including one set software and communication cord. Substation Automation System shall include the metering for all the bays. Tariff Metering is to be supplied from Europe, Canada, USA or Japan make. Printed catalogue, operation and service manual are to be provided.
- 1F7 Two (2) sets of SAS System including Operator Workstations and related software with all licenses (shall be perpetual and sufficient for all future bays), Necessary Ethernet switches and GPS for the SAS system, 55 inch LED Monitor, Color Laser Printers, Common alarm unit with hooter/buzzer, BCU for all common signals of the substation.

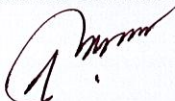
Additional 05 (five) No.'s of BCU for controlling 05 (five) No's of 33kV Load Shed Feeders shall be supplied. All five BCUs with required I/O shall be placed in one panel tested with SAS, NLDC. One (1) set of Engineering Workstation and all engineering software with licenses (shall not be time bound) shall be supplied. The Engineering/Workstation PCs shall have minimum configuration of core i7 (latest generation), clock speed of 3.4 GHz, 16GB RAM, 1TB SSD with RAID1, and 27" displays.

### 145 kV Circuits

The equipment to be supplied, installed and commissioned is shown in bid drawings are comprising of :-

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The equipment to be supplied, installed and commissioned is shown in bid drawings are comprising of :-

- 2F1 Control, Protection & Monitoring and Substation Automation System including event recording function for four (4) sets of overhead line circuits bays.
- 2F2 Control, Protection & Monitoring and Substation Automation System including event recording function for two (2) sets of 230/132/33kV three phase, auto power transformer circuits.
- 2F3 Complete Control, Protection & Monitoring and Substation Automation System including event recording function for bus coupler circuit.
- 2F4 Complete Busbar protection for 230kV system
- 2F5 Complete Independent standalone Digital Fault and Disturbance recorder (DFDR) with PMU functionality to monitor all 230kV bays, 132kV bays and 33kV incomer bays. Engineering workstation shall be supplied. DFDR should be integrated with central client station. The Engineering workstation PCs shall have minimum configuration of core i7 (latest generation), clock speed of 3.4 GHz, 16GB RAM, 1TB SSD with RAID1, and 27" display.
- 2F6 Complete Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVarh meters (accuracy class 0.2) for each 230 kV line and transformer feeder. For each feeder one meter shall be supplied including one set software and communication cord. Substation Automation System shall include the metering for all the bays. Tariff Metering is to be supplied from Europe, Canada, USA or Japan make. Printed catalogue, operation and service manual are to be provided.
- 2F7 Two (2) sets of SAS System including Operator Workstations and related software with all licenses (shall be perpetual and sufficient for all future bays), Necessary Ethernet switches and GPS for the SAS system, 55 inch LED Monitor, Color Laser Printers, Common alarm unit with hooter/buzzer, BCU for all common signals of the substation.

Additional 05 (five) No.'s of BCU for controlling 05 (five) No's of 33kV Load Shed Feeders shall be supplied. All five BCUs with required I/O shall be placed in one panel tested with SAS, NLDC. One (1) set of Engineering Workstation and all engineering software with licenses (shall not be time bound) shall be supplied. The Engineering/Workstation PCs shall have minimum configuration of core i7 (latest generation), clock speed of 3.4 GHz, 16GB RAM, 1TB SSD with RAID1, and 27" displays.

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### 145 kV Circuits

The equipment to be supplied, installed and commissioned is shown in bid drawings are comprising of :-

Control, Protection & Monitoring and Substation Automation System including event recording function for two (2) sets of overhead line circuits bays.

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| 2F8   | Control, Protection & Monitoring and Substation Automation System including event recording function for two (2) sets of 230/132/33 kV power transformer circuits.                                                                                                                                                                                                                                                                                                                                                              |
| 2F9.1 | Control, Protection & Monitoring and Substation Automation System including event recording function for two (2) sets of 132/33 kV power transformer circuits.                                                                                                                                                                                                                                                                                                                                                                  |
| 2F9.2 | Complete Control, Protection & Monitoring and Substation Automation System including event recording function for bus coupler circuit.                                                                                                                                                                                                                                                                                                                                                                                          |
| 2F10  | Complete Busbar protection for 132kV system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2F11  | Complete Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVARh meters (accuracy class 0.2) for each 132 kV line and transformer feeder For each feeder one meter shall be supplied including one set software and communication cord.. Substation Automation System shall include the metering for all the bays. Tariff Metering is to be supplied from Europe, Canada, USA or Japan make. Printed catalogue, operation and service manual are to be provided. |
| 2F12  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2F13  | Four (4) sets of Complete RTCC systems including transformer tap changer control, fan control & AVR as per 4.15(N) of section 4 in volume 2 of 3.                                                                                                                                                                                                                                                                                                                                                                               |

### 36kV Circuit

- |      |                                                                                                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2F14 | Two (2) sets of Control, Protection & Monitoring including BCU for two 33kV circuits connected between tertiary side of 230/132/33kV Power transformers and two sets of 33/0.415 kV station Auxiliary Transformers. |
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Design, Supply, Installation, Testing & Commissioning of 230/132/33 kV AIS Substation at Madhabpur and Monohardi including two nos. 132KV bay extension at Bajitpur 132/33kV grid substation and associated 230kV and 132kV Transmission Lines on turnkey basis (Package-2)

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2F15 Two (2) sets of Control, Protection & Monitoring including BCU for two 33kV circuits connected LV side of 132/33kV Power transformers.

2F16 Complete Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVARh meters (accuracy class 0.2) for each 33 kV transformer feeder. For each feeder one meter shall be supplied including one set software and communication cord. Space provision for another meter shall be kept in metering panel. Substation Automation System shall include the metering for all the bays. Tariff Metering is to be supplied from BPDB approved make. Printed catalogue, operation and service manual are to be provided.

## 2G Multicore Cables

2G1 One (1) lot complete set of multicore low voltage XLPE insulated power and control cables (IEC 60502) shall be supplied, installed, landed, terminated and have individual cores identified to be used for connection of all equipment supplied under the Contract. The overall substation cable routing and core schedules shall also be provided. Necessary Sizing calculation shall have to be submitted for approval during the execution stage.

## 2H Earthing and Lightning Protection

2H1 One (1) lot of design, supply and installation of earthing system for outdoor switchyard equipment & Control Room with necessary connectors and clamps, with design to suit the work under this contract arrangement. Calculation and GPR shall have to be shown using software like CYMGRD.

2H2 One (1) lot of design, supply and installation of lightning protection screen for outdoor switchyard equipment & Control Room with necessary connectors and clamps, with design to suit the work under this project. Supporting calculation shall have to be shown in the Rolling Sphere method.

## 2I Batteries, Chargers and DC Distribution

2I1 110V substation alkaline batteries complete with chargers and distribution switchboard to be supplied, installed and commissioned to provide all DC supplies to equipment being supplied.

The system shall generally be as shown in bid drawing and shall include:

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- 3J1 One (1) lot of extension of LVAC switchboard for substation services to be supplied, installed and commissioned, to provide the 415/240V supplies to all equipment being supplied under this turnkey Bid.

All AC status excluding control & protection (AC voltage status for each bus including coupling breaker on/off status, fail with alarm, status of AC MCB/MCCB at SPR with fail alarm etc.) shall be incorporated in the substation automation system.

**3K Civil Works, Building and Foundation**

- 3K1 One (1) lot of complete design, supply and construction of all civil items required for the outdoor works for two new bays suitable for switchyard gantry & equipment foundations, cable trenches, surfacing, drainage, gravel laying etc.

- 3K2 Testing of pile Foundation, Compression & uplift on random basis.

**3L Lighting, Small Power, Air Conditioning and Ventilation**

- 3L1 Deleted

- 3L2 One (1) lot of complete set of design, supply, installation and commissioning of equipment to provide lighting (flood light; sodium/mercury) for security, roadway, switchyard and emergency DC lighting system at strategic locations for equipment operation and inspection. Necessary Sizing calculation with software shall have to be submitted for approval during the execution stage.

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