Grid Substation 33 kV Bus) comprising: 33 kV Outdoor Circuit Breaker (36 kV, 2500 Amps, 31.5 kA 3 sec VCB), LA & PI, DS, CT, Control cable, Cable termination kit, PCM & Signaling Panels, Supporting structures etc. In addition, for connecting the underground cable, the EPC have to provide 3000A copper bar for each phase that will be installed on steel structure supported by 2 (two) nos. 33 kV post insulator. The LA will also be connected to the copper bar. The length of the copper bar should not be less than 1.5 meters. All necessary cable connecting holes, appropriate copper lugs (800 sq. mm.), fixing nut bolts etc. should be within the scope of supply.

2) Supply and installation of 33 kV, GIS Indoor Switchgear with 3000A bus with 33 kV Protection Control and Metering (PCM) in same 33 kV GIS Panel with Indoor Surge Arresters and other related accessories

   - Incoming feeder with Line PT (2500A)-2 Unit
   - Outgoing feeder (1250A)-11 Unit
   - Spare feeder (1250A)-1 Unit
   - Bus Coupler with Riser (2500A)-1 Unit
   - 33 kV Bus PT Panel-2 Sets
   - Station Auxiliary Transformer panel (LBS or VCB)-2 Sets

3) Supply and installation of 02 (two) nos Station use Auxiliary transformer 200 kVA, 33/0.415 KV ONAN, Dyn-11 including 0.415 KV MCCB 4CX150 Sq.mm PVC LV power cable, cable terminating kits with structures, etc, complete in all respect

4) Supply and installation of 02 (two) set (three nos, in one set) 33 kV Bus Potential Transformer of ratio $33/\sqrt{3}/0.11/\sqrt{3}/0.11/\sqrt{3}$ kV to be installed on the grid substation's 33 kV bus structure.

5) Supply and installation of Switchyard grounding materials for whole sub-station area
6) and equipment to be installed for grounding the neutrals of station transformers, their bodies, the lightning arrestor sets, the steel supporting structure, all indoor & outdoor panels etc. The grounding system is to be implemented on approved design. Earth resistance of the switching station shall be less than 0.5 ohm.

7) Supporting steel/ RCC structure for connecting the XLPE Power Cable with accessories as required. The indoor 33 kV XLPE copper cables will be connected to 33 kV GIS panel by requisite cable termination kit. The outdoor cable terminations of the 33 kV cables (where required) will be heat shrink type and supported by steel structure.

8) 33 kV 2x1Cx800mm2 cable per phase will connect 33 kV GIS Incoming Breaker (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

9) 33 kV 1x1Cx500mm2 cable per phase will connect 33 kV GIS Outgoing & Spare Breaker (Supply of Cable. Indoor and outdoor termination kits and connection work is under this scope).

10) 33 kV 3x1Cx95mm2 cable per phase will connect 33 KV GIS panel to Auxiliary transformer (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

11) Supply and installation of control room indoor illumination with energy efficient LED light. The switching station control room building shall have an emergency automated DC lighting system in case of power failure.

12) Supply and installation of Fire Detection & Alarm System including firefighting equipment.

13) Supply and installation of IPTV Camera System.

14) Supply and installation of Exhaust Fan for battery room.

15) Supply and Installation of 06 (six) nos. Split type Air Conditioner of capacity 48000 BTU/Hr. including MCB and all other accessories.

16) Supply and installation of Control-Relay Panels for 33 kV Incoming Feeders at Grid Substation 33 kV Bus. Conventional protection to incoming feeders are to be provided. However, a total protection scheme must be prepared and approved before commencing work.

17) Supply & installation of GIS Panel for 33kV Incoming & Outgoing Line feeders of the proposed 33kV Circuits to be installed in the control room building.

18) Supply and installation of AC Distribution Panel and DC Distribution Panel with interlocking facilities.

19) Outdoor lightning protection system for the switching station shall be installed.

20) Supply and installation of Separate AC distribution Box, wall mounting for control room internal & external illumination switching, extra power supply arrangement for testing purpose, different operation, and maintenance use.

21) Supply and installation of switch boards to be installed in each room for functioning of fans, lights, Air cooler etc.

22) Design, manufacture, supply, installation, and commissioning of Substation Automation System (SAS) for 33 kV system with provision for interfacing with SCADA System. The Substation Automation System (SAS) shall comprise full station and bay protection, control, monitoring and communication facilities. It shall enable local station control via PC by means of Human Machine Interface (HMI) and control software package and perform the necessary system control and data acquisition functions.

23) Supply and installation/ connection of Control Cables.

24) Supply and installation of Ni-Cd Battery and Battery Charger.

25) Supply and installation digital electronic sign board.

26) As-built drawings together with operation and maintenance manual, relevant IEC standards of the installed equipment shall be submitted.

27) Transportation of all equipment and materials, all installations, connections and testing, commissioning, inspection.

7.12.4 CONSTRUCTION OF 33KV GIS SWITCHING STATION IN CHARFASON UNDER BHOLA ESU.

(Not limited but at least the following works to be done by the turnkey contractor)

7.12.4.1 CIVIL & BUILDING WORKS:

1) Indoor GIS switching station should be constructed at a minimum height of 1.0 meters above the highest flood level or 1.0 meters above the nearest highway / road level, whichever is higher. The indoor GIS switching building will need approximately 550 square meter land inside the PGCB's Charfasson 230/33 KV Grid Substation. Prior to designing and constructing switching station building, it is essential to conduct soil testing to assess soil resistivity and soil bearing capacity. The soil testing results will guide the final leveling, consolidation, surfacing, and compaction of the control room area.

2) The landscaping and gardening for the area adjacent to the control room building should be carried out. The layout plan for the landscaping work must be created and approved before commencing the work.

3) Construction of cable trenches including cable tray/rack for power cable and control cable (where required)

   a. Grid substation 33 kV bus to switching station Incoming.
   b. 33 kV outgoing cable laying inside grid substation & switching station compound.

4) Boundary wall and retaining wall need to be built around the proposed control room area .

5) Main entrance and side gates need to be built .

6) RCC Foundations are required for station transformers, switchyard lowers, circuit breakers, and other equipment and structures.

7) 600 square meters complete two storied (with 3 storied foundation) Control room building (300 Sq-m each floor) shall be constructed. For the Control room building, the Cable trench space, Storeroom, Toilet, office room shall be installed on the Ground foor level (Clear Height 12'-0"), Control room, Battery Room shall be installed on the 1st floor level (Clear Height 14'-6").

8) A property insulated False Ceiling suitable for the Air conditioning system shat be installed in the control room.

9) The construction of drainage and sanitary systems for the control room and the adjacent area shall be carried out.

10) Operation Keyboard. AI/Steel frame front cover glass with locking device, dustproof, shall be supplied and installed.

11) A connecting road between the nearest highway road and the switching station's main gate shall be constructed.

12) Approach reads from the main gate or existing road to the control room entrance and internal roads for adjacent area and parking area as required shall be constructed.

13) Supply and installation of chain link fencing with gate. Earthing for fencing required.

14) Construction of septic tank, soak well, inspections pits, sewerage piping, and facilities for toilets and bathrooms shall be carried out.

15) Supply and instillation of overhead water tanks underground water reservoir, and water supply system shall be done.

16) Supply and installation of Wall clocks operator working tables, chairs, curtains for windows, Steel File Cabinets and Steel Almirah for record keeping in the control room.

17) Installation of switching station Name Plate and switching scheme MIMIC Display board.

18) Supply and construction of Power cable trench and control cable rack inside the ground floor of the control room building. Proper sealing is required of the control cable entry at Control Room building, to prevent water entering from the switchyard/outside to Control Room Building, preventing entry of rats and reptiles.

19) Supply and installation of office room, Control room indoor illumination. Lighting levels within the building must be generally designed to meet the requirements of IEC Standards, and meet the following specific lighting levels:
   - 400 lux between rows at switchgear front panels within the Control Building.
   - 400 lux at the front of the control panel within the Control Building.
   - 160 lux to the rear of switchgear in the Control building.
   - 160 lux adjacent to the Battery Storage, Load Management Equipment, AC and DC panels.

20) Supply and Installation of Outdoor Lighting (LED) & Emergency Lighting (LED) Lighting in the switching station must meet relevant IEC standards.

21) Supply and installation of decorative LED street lighting for the connecting road (if any) after every 15-meter interval (distance).

22) All doors and windows shall be finished with aluminum frames and high-quality transparent 6 mm thick glass. Both indoor and outdoor surface finishing works of walls, roof, etc., shall be synthetic high-quality plastic paint and moisture-proof snowcem respectively, and treatment shall be made by lime terracing for rainwater leakage-proof of the roof.

7.12.4.2 SWITCHING STATION/ELECTRICAL WORKS:

1) Supply and installation of 02 (two) nos. 33 kV Incoming Feeders (to be installed at Grid Substation 33 kV Bus) comprising: 33 kV Outdoor Circuit Breaker (36 kV, 2500 Amps, 31.5 kA 3 sec VCB), LA & PI, DS, CT, Control cable, Cable termination kit, PCM & Signaling Panels, Supporting structures etc. In addition, for connecting the underground cable, the EPC have to provide 3000A copper bar for each phase that will be installed on steel structure supported by 2 (two) nos. 33 kV post insulator. The LA will also be connected to the copper bar. The length of the copper bar should not be less than 1.5 meters. All necessary cable connecting holes, appropriate copper lugs (800 sq. mm.), fixing nut bolts etc. should be within the scope of supply.

2) Supply and installation of 33 kV, GIS Indoor Switchgear with 3000A bus with KV Protection Control and Metering (PCM) in same 33 kV GIS Panel with Indoor Surge Arresters and other related accessories.

   - Incoming feeder with Line PT (2500A)-2 Unit
   - Outgoing feeder (1250A)-9 Unit
   - Bus Coupler with Riser (2500A)-1 Unit
   - Spare feeder (1250A)-1 Unit
   - 33 KV Bus PT Panel-2 Sets
   - Station Auxiliary Transformer panel (LBS OR VCB)-2 Sets

3) Supply and installation of 02 (two) nos Station use Auxiliary transformer 200 kVA 33/0.415 KV. ONAN, Dyn-11 including 0 415 AV MCCB 4CX150 Sq mm PVC LV power cable, cable terminating kits with structures, ets complete in all respect.

4) Supply and installation of 02 (two) set (three nos in one set) 33 KV Bus Potential Transformer of ratio $33/\sqrt{3}/0.11/\sqrt{3}/0.11/\sqrt{3}$ kV, to be installed on the grid substation's 33 KV bus structure.

5) Supply and instillation of Switchyard-grounding material for whole sub-station area and equipment to be installed for grounding the neutrals of station transformers, their bodies, the lightning arrestor sets, the steel supporting structure, all indoor & outdoor panels etc. The grounding system is to be implemented on approved design. Earth resistance of the switching station shall be less than 0.5 ohm.

6) Supporting steel RCC structure for connecting the XLPE Power Cable with accessories as required. The indoor KV XLPE copper cables will be connected to 33 KV GIS panel by requisite cable termination kit. The outdoor cable terminations of the 33 kV cables (where required) will be heat shrink type and supported by steel structure.

7) 33 KV 2x1Cx800mm2 cable per phase will connect 33 kV GIS Incoming Breaker (Supply of Cable, Indoor and outdoor termination its and connection work is under this scope).

8) 33 kV 1x1Cx500mm2 cable per phase will connect 33 KV GIS Outgoing & Spare Breaker (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).
9) 33 kV 3x1Cx95mm2 cable per phase will connect 33 KV GIS panel to Auxiliary transformer (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

10) Supply and installation of control room indoor Illumination with energy efficient LED light. The switching station control room building shall have an emergency automated DC lighting system in case of power failure.

11) Supply and installation of Fire Detection & Alarm System including firefighting equipment.

12) Supply and installation of IPTV Camera System.

13) Supply and installation of Exhaust Fan for battery room.

14) Supply and Installation of 06 (six) nos. Split type Air Conditioner of capacity 40000 BTU/Hr. including MCB and all other accessories.

15) Supply and installation of Control-Relay Panel for 33 KV Incoming Feeders at Grid Substation 33 kV Bus. Conventional protection to incoming feeders are to be provided. However, a total protection scheme must be prepared and approved before commencing work.

16) Supply & installation of GIS Panel for 33kV Incoming & Outgoing Line feeders of the proposed 33kV Circuits to be instlled in the control room building.

17) Supply and installation of AC Distribution Panel and DC Distribution Panel with interlocking facilities.
18) Outdoor lightning protection system for the switching station shall be installed.

19) Supply and installation of Separate AC distribution Box, wall mounting for control room internal & external illumination switching extra power supply arrangement for testing purpose, different operation and maintenance use.

20) Supply and installation of switch boards to be installed in each room for functioning of fans, lights, Air cooler etc.

21) Design, manufacture, supply, installation, and commissioning of Substation Automation System (SAS) for 33 kV system with provision for interfacing with SCADA System. The Substation Automation System (SAS) shall comprise full station and bay protection, control, monitoring and communication facilities. It shall enable local station control via PC by means of Human Machine Interface (HMI) and control software package and perform the necessary system control and data acquisition functions.

22) Supply and installation connection of Control Cables.

23) Supply and installation of Ni-Cd Battery and Battery Charger.

24) Supply and installation digital electronic sign board.
25) As-built drawings together with operation and maintenance manual, relevant IEC standards of the installed equipment shall be submitted.

26) Transportation of all equipment and materials, all installations, connections and testing, commissioning, inspection.

7.12.5 CONSTRUCTION OF 33KV GIS SWITCHING STATION IN JHALOKATHI.

(Not limited but at least the following works to be done by the turnkey contractor)

7.12.5.1 CIVIL & BUILDING WORKS:

1) Indoor GIS switching station should be constructed at a minimum height of 1.0 meters above the highest flood level or 1.0 meters above the nearest highway/road level, whichever is higher. The indoor GIS switching building will need approximately 550 square meter land inside the PGCB's Jhalokathi 132/33 KV Grid Substation. Prior to designing and constructing switching station building, it is essential to conduct soil testing to assess soil resistivity and soil bearing capacity. The soil testing results will guide the final leveling, consolidation, surfacing, and compaction of the control room area.

2) The landscaping and gardening for the area adjacent to the control room building should be carried out. The layout plan for the landscaping work must be created and approved before commencing the work.

3) Construction of cable trenches including cable tray by rack for power cable and control cable (where required)

   a. Grid substation 33 kV bus to switching station Incoming.
   b. 33 kV outgoing cable laying inside grid substation & switching station compound.

4) Boundary wall and retaining wall need to be built around the proposed control room area.

5) RCC Foundations are required for station transformers, switchyard lowers, circuit breakers, and other equipment and structures.

6) 600 square meters complete two storied (with 3 storied foundation) Control room building (300 Sq-m each floor) shall be constructed. For the Control room building, the Cable trench space, Storeroom, Toilet, office room shall be installed on the Ground foor level (Clear Height 12'-0"), Control room, Battery Room shall be installed on the 1st floor level (Clear Height 14'-6").

7) A property insulated False Ceiling suitable for the Air conditioning system shat be installed in the control room.

8) The construction of drainage and sanitary systems for the control room and the adjacent area shall be carried out.

9) Operation Keyboard. AI/Steel frame front cover glass with locking device, dustproof, shall be supplied and installed.

10) A connecting road between the nearest highway road and the switching station's main gate shall be constructed.

11) Approach reads from the main gate or existing road to the control room entrance and internal roads for adjacent area and parking area as required shall be constructed.

12) Construction of septic tank, soak well, inspections pits, sewerage piping, and facilities for toilets and bathrooms shall be carried out.

13) Supply and instillation of overhead water tanks underground water reservoir, and water supply system shall be done.

14) Supply and installation of Wall clocks operator working tables, chairs, curtains for windows, Steel File Cabinets and Steel Almirah for record keeping in the control room.

15) Installation of switching station Name Plate and switching scheme MIMIC Display board.

16) Supply and construction of Power cable trench and control cable rack inside the ground floor of the control room building. Proper sealing is required of the control cable entry at Control Room building, to prevent water entering from the switchyard/outside to Control Room Building, preventing entry of rats and reptiles.

17) Supply and installation of office room, Control room indoor illumination. Lighting levels within the building must be generally designed to meet the requirements of IEC Standards, and meet the following specific lighting levels:
   - 400 lux between rows at switchgear front panels within the Control Building.
   - 400 lux at the front of the control panel within the Control Building.
   - 160 lux to the rear of switchgear in the Control building.
   - 160 lux adjacent to the Battery Storage, Load Management Equipment, AC and DC panels.

18) Supply and Installation of Outdoor Lighting (LED) & Emergency Lighting (LED) Lighting in the switching station must meet relevant IEC standards.

19) Supply and installation of decorative LED street lighting for the connecting road (if any) after every 15-meter interval (distance).

20) All doors and windows shall be finished with aluminum frames and high-quality transparent 6 mm thick glass. Both indoor and outdoor surface finishing works of walls, roof, etc., shall be synthetic high-quality plastic paint and moisture-proof snowcem respectively, and treatment shall be made by lime terracing for rainwater leakage-proof of the roof.

7.12.5.2 SWITCHING STATION/ELECTRICAL WORKS:

1) Supply and installation of 02 (two) nos. 33 kV Incoming Feeders (to be installed at Grid Substation 33 kV Bus) comprising: 33 kV Outdoor Circuit Breaker (36 kV, 2500 Amps, 31.5 kA 3 sec VCB), LA & PI, DS, CT, Control cable, Cable termination kit, PCM & Signaling Panels, Supporting structures etc. In addition, for connecting the underground cable, the EPC have to provide 3000A copper bar for each phase that will be installed on steel structure supported by 2 (two) nos. 33 kV post insulator. The LA will also be connected to the copper bar. The length of the copper bar should not be less than 1.5 meters. All necessary cable connecting holes, appropriate copper lugs (800 sq. mm.), fixing nut bolts etc. should be within the scope of supply.

2) Supply and installation of 33 kV, GIS Indoor Switchgear with 3000A bus with KV Protection Control and Metering (PCM) in same 33 kV GIS Panel with Indoor Surge Arresters and other related accessories.

- Incoming feeder with Line PT (2500A)-2 Unit
- Outgoing feeder (1250A)-7 Unit
- Spare feeder (1250A)-1 Unit
- Bus Coupler with Riser (2500A)-1 Unt
- 33 KV Bus PT Panel-2 Sets
- Station Auxiliary Transformer panel (LBS OR VCB)-2 Sets

3) Supply and installation of 02 (two) nos Station use Auxiliary transformer 200 kVA 33/0.415 KV. ONAN, Dyn-11 including 0 415 AV MCCB 4CX150 Sq mm PVC LV power cable, cable terminating kits with structures, ets complete in all respect.

4) Supply and installation of 02 (two) set (three nos in one set) 33 KV Bus Potential Transformer of ratio $33/\sqrt{3}/0.11/\sqrt{3}/0.11/\sqrt{3}$ kV, to be installed on the grid substation's 33 KV bus structure.

5) Supply and installation of Switchyard-grounding material for whole sub-station area and equipment to be installed for grounding the neutrals of station transformers, their bodies, the lightning arrestor sets, the steel supporting structure, all indoor & outdoor panels etc. The grounding system is to be implemented on approved design. Earth resistance of the switching station shall be less than 0.5 ohm.

6) Supporting steel RCC structure for connecting the XLPE Power Cable with

accessories as required. The indoor 33 KV XLPE copper cables will be connected to 33 KV GIS panel by requisite cable termination kit. The outdoor cable terminations of the 33 kV cables (where required) will be heat shrink type and supported by steel structure.

7) 33 KV 2x1Cx800mm2 cable per phase will connect 33 kV GIS Incoming Breaker (Supply of Cable, Indoor and outdoor termination its and connection work is under this scope).

8) 33 kV 1x1Cx500mm2 cable per phase will connect 33 KV GIS Outgoing & Spare Breaker (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

9) 33 kV 3x1Cx95mm2 cable per phase will connect 33 KV GIS panel to Auxiliary transformer (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

10) Supply and installation of control room indoor Illumination with energy efficient LED light. The switching station control room building shall have an emergency automated DC lighting system in case of power failure.

11) Supply and installation of Fire Detection & Alarm System including firefighting equipment.

12) Supply and installation of IPTV Camera System.

13) Supply and installation of Exhaust Fan for battery room.

14) Supply and Installation of 06 (six) nos. Split type Air Conditioner of capacity 40000 BTU/Hr. including MCB and all other accessories.

15) Supply and installation of Control-Relay Panel for 33 KV Incoming Feeders at Grid Substation 33 kV Bus. Conventional protection to incoming feeders are to be provided. However, a total protection scheme must be prepared and approved before commencing work.

16) Supply & installation of GIS Panel for 33kV Incoming & Outgoing Line feeders of the proposed 33kV Circuits to be instated in the control room building.

17) Supply and installation of AC Distribution Panel and DC Distribution Panel with interlocking facilities.

18) Outdoor lightning protection system for the switching station shall be installed.

19) Supply and installation of Separate AC distribution Box, wall mounting for control room internal & external illumination switching extra power supply arrangement for testing purpose, different operation and maintenance use.

20) Supply and installation of switch boards to be installed in each room for functioning of fans, lights, Air cooler etc.

21) Design, manufacture, supply, installation and commissioning of Substation Automation System (SAS) for 33 kV system with provision for interfacing with SCADA System. The Substation Automation System (SAS) shall comprise full station and bay protection, control, monitoring and communication facilities. It shall enable local station control via PC by means of Human Machine Interface (HMI) and control software package and perform the necessary system control and data acquisition functions.

22) Supply and installation connection of Control Cables.

23) Supply and installation of Ni-Cd Battery and Battery Charger.

24) Supply and installation digital electronic sign board.
25) As-built drawings together with operation and maintenance manual, relevant IEC standards of the installed equipment shall be submitted.

26) Transportation of all equipment and materials, all installations, connections and testing, commissioning, inspection.

7.12.6 CONSTRUCTION OF 33KV GIS SWITCHING STATION IN MAHESHPUR ESU UNDER JHENAIDAH S&D-02.

(Not limited but at least the following works to be done by the turnkey contractor)

7.12.6.1 CIVIL & BUILDING WORKS:

1) Indoor GIS switching station should be constructed at a minimum height of 1.0 meters above the highest flood level or 1.0 meters above the nearest highway / road level, whichever is higher. The indoor GIS switching building will need approximately 550 square meter land inside the PGCB's Maheshpur 132/33 KV Grid Substation. Prior to designing and constructing switching station building, it is essential to conduct soil testing to assess soil resistivity and soil bearing capacity. The soil testing results will guide the final leveling, consolidation, surfacing, and compaction of the control room area.

2) The landscaping and gardening for the area adjacent to the control room building should be carried out. The layout plan for the landscaping work must be created and approved before commencing the work.

3) Construction of cable trenches including cable tray / rack for power cable and control cable (where required)

   a. Grid substation 33 kV bus to switching station Incoming.
   b. 33 kV outgoing cable laying inside grid substation & switching station compound.

4) RCC Foundations are required for station transformers, switchyard lowers, circuit

breakers, and other equipment and structures.

5) 600 square meters complete two storied (with 3 storied foundation) Control room building (300 Sq-m each floor) shall be constructed. For the Control room building, the Cable trench space, Storeroom, Toilet, office room shall be installed on the Ground foor level (Clear Height 12'-0"), Control room, Battery Room shall be installed on the 1st floor level (Clear Height 14'-6").

6) A property insulated False Ceiling suitable for the Air conditioning system shat be installed in the control room.

7) The construction of drainage and sanitary systems for the control room and the adjacent area shall be carried out.

8) Operation Keyboard. Al/Steel frame front cover glass with locking device, dustproof, shall be supplied and installed.

9) A connecting road between the nearest highway road and the switching station's main gate shall be constructed.

10) Approach reads from the main gate or existing road to the control room entrance and internal roads for adjacent area and parking area as required shall be constructed.

11) Supply and installation of chain link fencing with gate (if requred). Earthing for fencing required.

12) Construction of septic tank, soak well, inspections pits, sewerage piping, and facilities for toilets and bathrooms shall be carried out.

13) Supply and installation of overhead water tanks underground water reservoir, and
14) water supply system shall be done.

15) Supply and installation of Wal clocks operator working tables, chairs, curtains for windows, Steel File Cabinets and Steel Almirah for record keeping in the control room.

16) Installation of switching station Name Plate and switching scheme MIMIC Display board.

17) Supply and construction of Power cable trench and control cable rack inside the ground floor of the control room building. Proper sealing is required of the control cable entry at Control Room building, to prevent water entering from the switchyard/outside to Control Room Building, preventing entry of rats and reptiles.

18) Supply and installation of office room, Control room indoor illumination. Lighting levels within the building must be generally designed to meet the requirements of IEC Standards, and meet the following specific lighting levels:

- 400 lux between rows at switchgear front panels within the Control Building.
- 400 lux at the front of the control panel within the Control Building.

- 160 lux to the rear of switchgear in the Control building.
- 160 lux adjacent to the Battery Storage, Load Management Equipment, AC and DC panels.

19) Supply and Installation of Outdoor Lighting (LED) & Emergency Lighting (LED) Lighting in the switching station must meet relevant IEC standards.

20) Supply and installation of decorative LED street lighting for the connecting road (if any) after every 15-meter interval (distance).

21) All doors and windows shall be finished with aluminum frames and high-quality transparent 6 mm thick glass. Both indoor and outdoor surface finishing works of walls, roof, etc., shall be synthetic high-quality plastic paint and moisture-proof snowcem respectively, and treatment shall be made by lime terracing for rainwater leakage-proof of the roof.

7.12.6.2 SWITCHING STATION/ELECTRICAL WORKS:

1) Supply and installation of 02 (two) nos. 33 kV Incoming Feeders (to be installed at Grid Substation 33 kV Bus) comprising: 33 kV Outdoor Circuit Breaker (36 kV, 2500 Amps, 31.5 kA 3 sec VCB), LA & PI, DS, CT, Control cable, Cable termination kit, PCM & Signaling Panels, Supporting structures etc. In addition, for connecting the underground cable, the EPC have to provide 3000A copper bar for each phase that will be installed on steel structure supported by 2 (two) nos. 33 kV post insulator. The LA will also be connected to the copper bar. The length of the copper bar should not be less than 1.5 meters. All necessary cable connecting holes, appropriate copper lugs (800 sq. mm.), fixing nut bolts etc. should be within the scope of supply.

2) Supply and installation of 33 kV, GIS Indoor Switchgear with 3000A bus with KV Protection Control and Metering (PCM) in same 33 kV GIS Panel with Indoor Surge Arresters and other related accessories.

- Incoming feeder with Line PT (2500A)-2 Unit
- Outgoing feeder (1250A)-7 Unit
- Bus Coupler with Riser (2500A)-1 Unit
- Spare feeder (1250A)-1 Unit
- 33 KV Bus PT Panel-2 Sets
- Station Auxiliary Transformer panel (LBS OR VCB)-2 Sets

3) Supply and installation of 02 (two) nos Station use Auxiliary transformer 200 kVA 33/0.415 KV. ONAN, Dyn-11 including 0 415 AV MCCB 4CX150 Sq mm PVC LV power cable, cable terminating kits with structures, ets complete in all respect.

4) Supply and installation of 02 (two) set (three nos in one set) 33 KV Bus Potential

Transformer of ratio 33/√3/0.11/√3/0.11/√3 kV, to be installed on the grid substation's 33 KV bus structure.

5) Supply and installation of Switchyard-grounding material for whole sub-station area and equipment to be installed for grounding the neutrals of station transformers, their bodies, the lightning arrestor sets, the steel supporting structure, all indoor & outdoor panels etc. The grounding system is to be implemented on approved design. Earth resistance of the switching station shall be less than 0.5 ohm.

6) Supporting steel RCC structure for connecting the XLPE Power Cable with accessories as required. The indoor KV XLPE copper cables will be connected to 33 KV GIS panel by requisite cable termination kit. The outdoor cable terminations of the 33 kV cables (where required) will be heat shrink type and supported by steel structure.

7) 33 KV 2x1Cx800mm2 cable per phase will connect 33 kV GIS Incoming Breaker (Supply of Cable, Indoor and outdoor termination its and connection work is under this scope).

8) 33 kV 1x1Cx500mm2 cable per phase will connect 33 KV GIS Outgoing & Spare Breaker (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

9) 33 kV 3x1Cx95mm2 cable per phase will connect 33 KV GIS panel to Auxiliary transformer (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

10) Supply and installation of control room indoor Illumination with energy efficient LED light. The switching station control room building shall have an emergency automated DC lighting system in case of power failure.

11) Supply and installation of Fire Detection & Alarm System including firefighting equipment.

12) Supply and installation of IPTV Camera System.

13) Supply and installation of Exhaust Fan for battery room.

14) Supply and Installation of 06 (six) nos. Split type Air Conditioner of capacity 40000 BTU/Hr. including MCB and all other accessories.

15) Supply and installation of Control-Relay Panel for 33 KV Incoming Feeders at Grid Substation 33 kV Bus. Conventional protection to incoming feeders are to be provided. However, a total protection scheme must be prepared and approved before commencing work.

16) Supply & installation of GIS Panel for 33kV Incoming & Outgoing Line feeders of the proposed 33kV Circuits to be instated in the control room building.

17) Supply and installation of AC Distribution Panel and DC Distribution Panel with interlocking facilities.
18) Outdoor lightning protection system for the switching station shall be installed

19) Supply and installation of Separate AC distribution Box, wall mounting for control room
20) internal & external illumination switching extra power supply arrangement for testing purpose, different operation and maintenance use.

21) Supply and installation of switch boards to be installed in each room for functioning of fans, lights, Air cooler etc.

22) Design, manufacture, supply, installation, and commissioning of Substation Automation System (SAS) for 33 kV system with provision for interfacing with SCADA System. The Substation Automation System (SAS) shall comprise full station and bay protection, control, monitoring and communication facilities. It shall enable local station control via PC by means of Human Machine Interface (HMI) and control software package and perform the necessary system control and data acquisition functions.

23) Supply and installation connection of Control Cables.

24) Supply and installation of Ni-Cd Battery and Battery Charger.

25) Supply and installation digital electronic sign board.
26) As-built drawings together with operation and maintenance manual, relevant IEC standards of the installed equipment shall be submitted.

27) Transportation of all equipment and materials, all installations, connections and testing, commissioning, inspection.

7.12.7 CONSTRUCTION OF 33KV GIS SWITCHING STATION IN MEHERPUR ESU UNDER KUSHTIA S&D-02.

(Not limited but at least the following works to be done by the turnkey contractor)

7.12.7.1 A. CIVIL & BUILDING WORKS:

1) Indoor GIS switching station should be constructed at a minimum height of 1.0 meters above the highest flood level or 1.0 meters above the nearest highway/road level, whichever is higher. The indoor GIS switching building will need approximately 550 square meter land inside the PGCB's Meherpur 132/33 KV Grid Substation. Prior to designing and constructing switching station building, it is essential to conduct soil testing to assess soil resistivity and soil bearing capacity. The soil testing results will guide the final leveling, consolidation, surfacing, and compaction of the control room area.

2) The landscaping and gardening for the area adjacent to the control room building should be carried out. The layout plan for the landscaping work must be created and approved before commencing the work.

3) Construction of cable trenches including cable tray/rack for power cable and control cable (where required)

   a. Grid substation 33 kV bus to switching station Incoming.
   b. 33 kV outgoing cable laying inside grid substation & switching station compound.

4) Main entrance and side gates need to be built

5) RCC Foundations are required for station transformers, switchyard lowers, circuit breakers, and other equipment and structures.

6) 600 square meters complete two storied (with 3 storied foundation) Control room building (300 Sq-m each floor) shall be constructed. For the Control room building, the Cable trench space, Storeroom, Toilet, office room shall be installed on the Ground foor level (Clear Height 12'-0"), Control room, Battery Room shall be installed on the 1st floor level (Clear Height 14'-6").

7) A property insulated False Ceiling suitable for the Air conditioning system shat be installed in the control room.

8) The construction of drainage and sanitary systems for the control room and the adjacent area shall be carried out.

9) Operation Keyboard. All Steel frame front cover glass with locking device, dustproof, shall be supplied and installed.

10) A connecting road between the nearest highway road and the switching station's main gate shall be constructed.

11) Approach reads from the main gate or existing road to the control room entrance and internal roads for adjacent area and parking area as required shall be constructed.

12) Supply and installation of chain link fencing with gate. Earthing for fencing required.

13) Construction of septic tank, soak well, inspections pits, sewerage piping, and facilities for toilets and bathrooms shall be carried out.

14) Supply and installation of overhead water tanks underground water reservoir, and water supply system shall be done.

15) Supply and installation of Wall clocks operator working tables, chairs, curtains for windows, Steel File Cabinets and Steel Almirah for record keeping in the control room.

16) Installation of switching station Name Plate and switching scheme MIMIC Display board.

17) Supply and construction of Power cable trench and control cable rack inside the ground floor of the control room building. Proper sealing is required of the control cable entry at Control Room building, to prevent water entering from the switchyard/outside to Control Room Building, preventing entry of rats and reptiles.

18) Supply and installation of office room, Control room indoor illumination. Lighting levels within the building must be generally designed to meet the requirements of IEC Standards, and meet the following specific lighting levels:

- 400 lux between rows at switchgear front panels within the Control Building.
- 400 lux at the front of the control panel within the Control Building.
- 160 lux to the rear of switchgear in the Control building.
- 160 lux adjacent to the Battery Storage, Load Management Equipment, AC and DC panels.

19) Supply and Installation of Outdoor Lighting (LED) & Emergency Lighting (LED) Lighting in the switching station must meet relevant IEC standards.

20) Supply and installation of decorative LED street lighting for the connecting road (if any) after every 15-meter interval (distance).

21) All doors and windows shall be finished with aluminum frames and high-quality transparent 6 mm thick glass. Both indoor and outdoor surface finishing works of walls, roof, etc., shall be synthetic high-quality plastic paint and moisture-proof snowcem respectively, and treatment shall be made by lime terracing for rainwater leakage-proof of the roof.

7.12.7.2 SWITCHING STATION/ELECTRICAL WORKS:

1) Supply and installation of 02 (two) nos. 33 kV Incoming Feeders (to be installed at Grid Substation 33 kV Bus) comprising: 33 kV Outdoor Circuit Breaker (36 kV, 2500 Amps, 31.5 kA 3 sec VCB), LA & PI, DS, CT, Control cable, Cable termination kit, PCM & Signaling Panels, Supporting structures etc. In addition, for connecting the underground cable, the EPC have to provide 3000A copper bar for each phase that will be installed on steel structure supported by 2 (two) nos. 33 kV post insulator. The LA will also be connected to the copper bar. The length of the copper bar should not be less than 1.5 meters. All necessary cable connecting holes, appropriate copper lugs (800 sq. mm.), fixing nut bolts etc. should be within the scope of supply.

2) Supply and installation of 33 kV, GIS Indoor Switchgear with 3000A bus with KV Protection Control and Metering (PCM) in same 33 kV GIS Panel with Indoor Surge Arresters and other related accessories.

   - Incoming feeder with Line PT (2500A)-2 Unit
   - Outgoing feeder (1250A)-7 Unit
   - Spare feeder (1250A)-1 Unit

- Bus Coupler with Riser (2500A)-1 Unit
- 33 KV Bus PT Panel-2 Sets
- Station Auxiliary Transformer panel (LBS OR VCB)-2 Sets

3) Supply and installation of 02 (two) nos Station use Auxiliary transformer 200 kVA 33/0.415 KV. ONAN, Dyn-11 including 0 415 AV MCCB 4CX150 Sq mm PVC LV power cable, cable terminating kits with structures, ets complete in all respect.

4) Supply and installation of 02 (two) set (three nos in one set) 33 KV Bus Potential Transformer of ratio $33/\sqrt{3}/0.11/\sqrt{3}/0.11/\sqrt{3}$ kV to be installed on the grid substation's 33 KV bus structure.

5) Supply and installation of Switchyard-grounding material for whole sub-station area and equipment to be installed for grounding the neutrals of station transformers, their bodies, the lightning arrestor sets, the steel supporting structure, all indoor & outdoor panels etc. The grounding system is to be implemented on approved design. Earth resistance of the switching station shall be less than 0.5 ohm.

6) Supporting steel RCC structure for connecting the XLPE Power Cable with accessories as required. The indoor KV XLPE copper cables will be connected to 33 KV GIS panel by requisite cable termination kit. The outdoor cable terminations of the 33 kV cables (where required) will be heat shrink type and supported by steel structure.

7) 33 KV 2x1Cx800mm2 cable per phase will connect 33 kV GIS Incoming Breaker (Supply of Cable, Indoor and outdoor termination its and connection work is under this scope).

8) 33 kV 1x1Cx500mm2 cable per phase will connect 33 KV GIS Outgoing & Spare Breaker (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

9) 33 kV 3x1Cx95mm2 cable per phase will connect 33 KV GIS panel to Auxiliary transformer (Supply of Cable, Indoor and outdoor termination kits and connection work is under this scope).

10) Supply and installation of control room indoor Illumination with energy efficient LED light. The switching station control room building shall have an emergency automated DC lighting system in case of power failure.

11) Supply and installation of Fire Detection & Alarm System including firefighting equipment.

12) Supply and installation of IPTV Camera System.

13) Supply and installation of Exhaust Fan for battery room.

14) Supply and Installation of 06 (six) nos. Split type Air Conditioner of capacity 40000 BTU/Hr. including MCB and all other accessories.

15) Supply and installation of Control-Relay Panel for 33 KV Incoming Feeders at Grid Substation 33 kV Bus. Conventional protection to incoming feeders are to be provided. However, a total protection scheme must be prepared and approved before commencing work.

16) Supply & installation of GIS Panel for 33kV Incoming & Outgoing Line feeders of the proposed 33kV Circuits to be instated in the control room building.

17) Supply and installation of AC Distribution Panel and DC Distribution Panel with interlocking facilities.
18) Outdoor lightning protection system for the switching station shall be installed

19) Supply and installation of Separate AC distribution Box, wall mounting for control room internal & external illumination switching extra power supply arrangement for testing purpose, different operation and maintenance use.

20) Supply and installation of switch boards to be installed in sach room for functioning of fans, lights, Air cooler etc.

21) Design, manufacture, supply, installation, and commissioning of Substation Automation System (SAS) for 33 kV system with provision for interfacing with SCADA System. The Substation Automation System (SAS) shall comprise full station and bay protection, control, monitoring and communication facilities. It shall enable local station control via PC by means of Human Machine Interface (HMI) and control software package and perform the necessary system control and data acquisition functions.

22) Supply and installation connection of Control Cables.

23) Supply and installation of Ni-Cd Battery and Battery Charger.

24) Supply and installation digital electronic sign board.
25) As-built drawings together with operation and maintenance manual, relevant IEC standards of the installed equipment shall be submitted.

26) Transportation of all equipment and materials, all installations, connections and testing, commissioning, inspection.