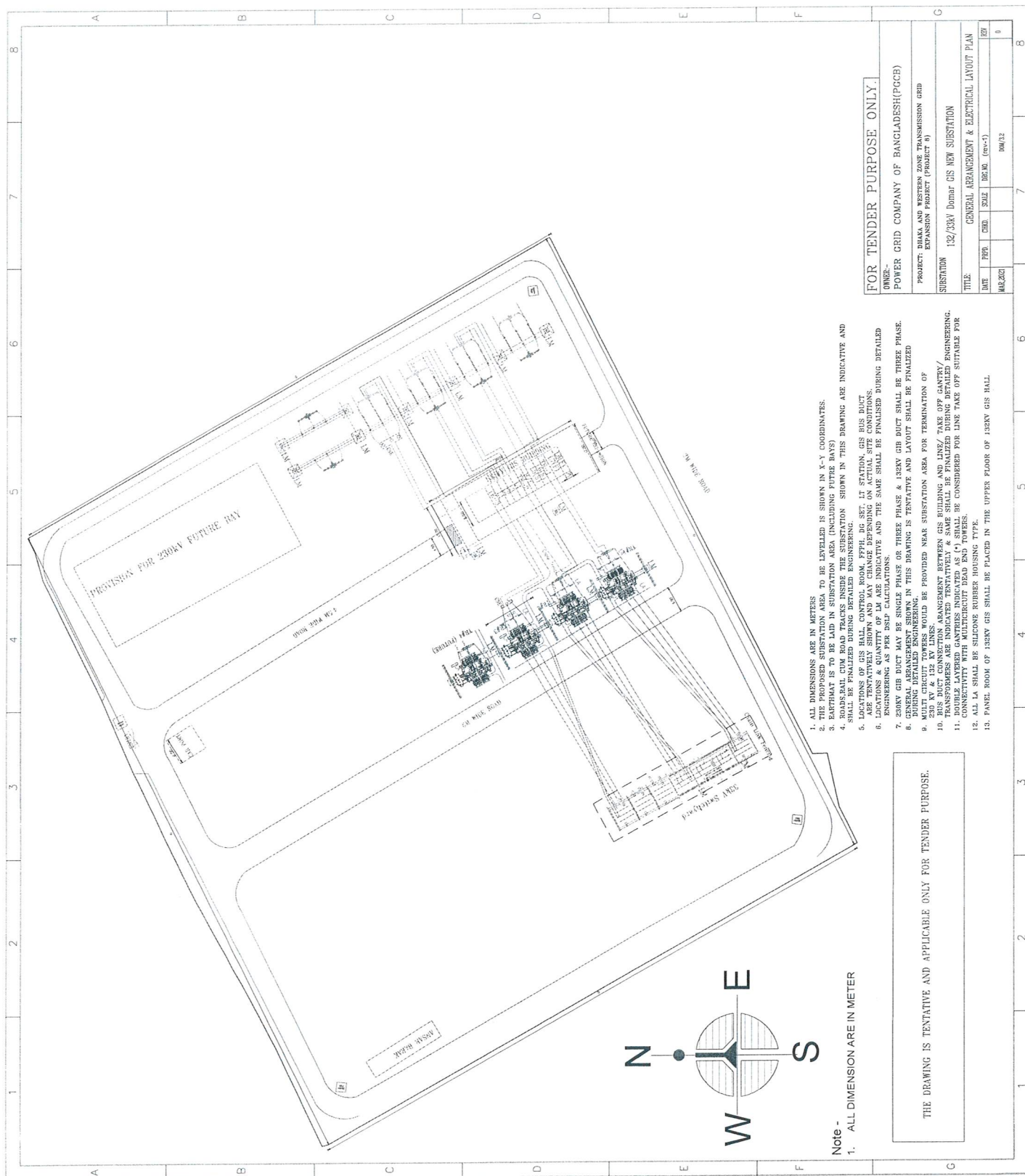


ATTACHMENT-6

Signature

Signature

Signature



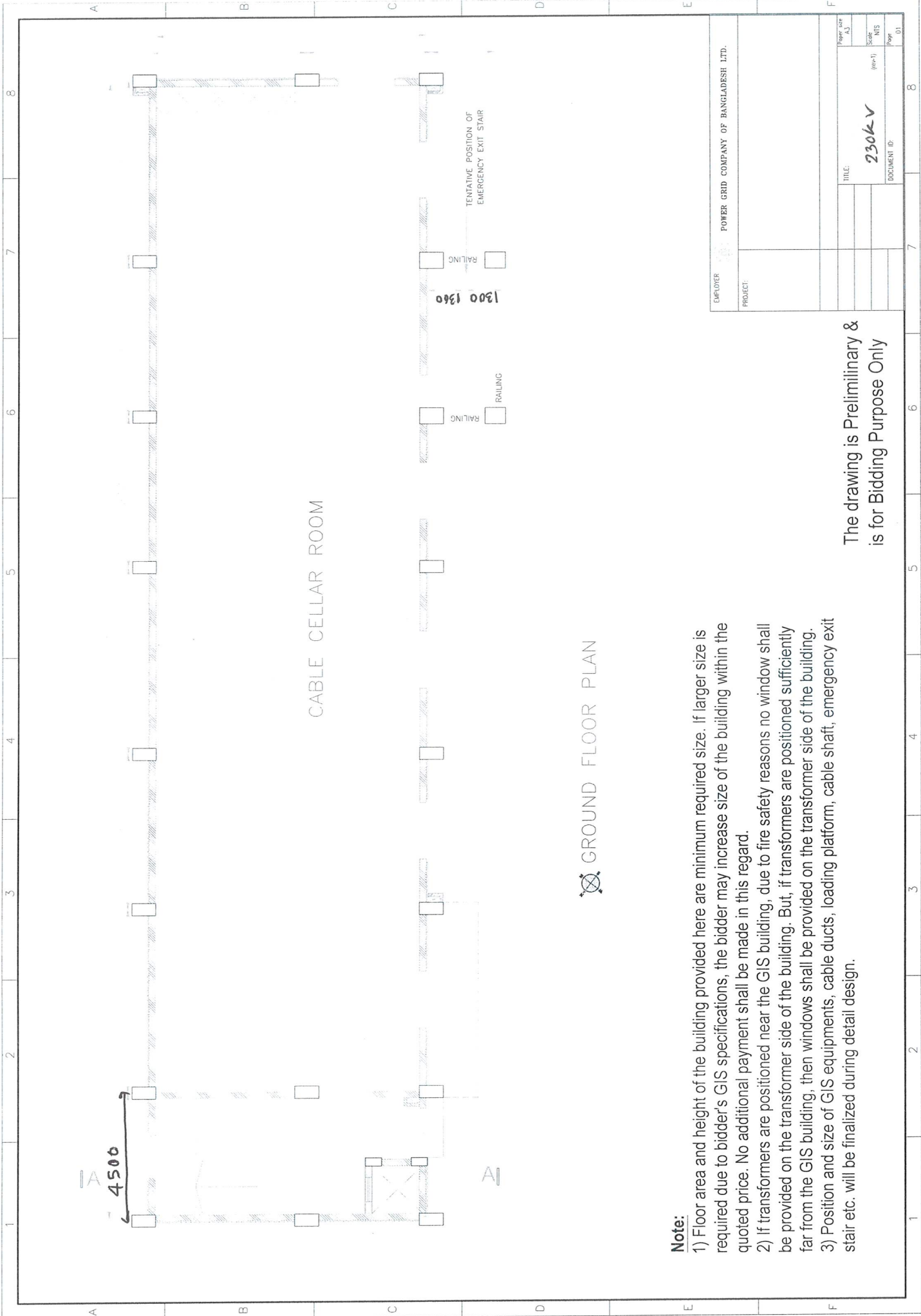
Note -
1. ALL DIMENSION ARE IN METER

THE DRAWING IS TENTATIVE AND APPLICABLE ONLY FOR TENDER PURPOSE.

1. ALL DIMENSIONS ARE IN METERS.
2. THE PROPOSED SUBSTATION AREA TO BE LEVELLED IS SHOWN IN X-Y COORDINATES.
3. EARTH MAT IS TO BE LAID IN SUBSTATION AREA (INCLUDING FUTURE BAYS)
4. ROAD/RAIL CUM ROAD TRACKS INSIDE THE SUBSTATION SHOWN IN THIS DRAWING ARE INDICATIVE AND SHALL BE FINALIZED DURING DETAILED ENGINEERING.
5. LOCATIONS OF GIS HALL, CONTROL ROOM, PPPL, DG SET, LT STATION, GIS BUS DUCT, AND OVERHEAD LINES SHALL BE INDICATIVE AND THE SAME SHALL BE FINALIZED DURING DETAILED ENGINEERING AS PER DISIP CALCULATIONS.
6. LOCATIONS & QUANTITY OF LM ARE INDICATIVE AND THE SAME SHALL BE FINALIZED DURING DETAILED ENGINEERING.
7. 230KV GIS DUCT MAY BE SINGLE PHASE OR THREE PHASE & 132KV GIS DUCT SHALL BE THREE PHASE.
8. GENERAL ARRANGEMENT SHOWN IN THIS DRAWING IS TENTATIVE AND LAYOUT SHALL BE FINALIZED DURING DETAILED ENGINEERING.
9. MULTICIRCUIT TOWERS WOULD BE PROVIDED NEAR SUBSTATION AREA FOR TERMINATION OF 230 KV & 132 KV LINES.
10. GENERAL ARRANGEMENT BETWEEN GIS BUILDINGS AND LINES/ BAYS OFF GANTRY/ TRANSFORMERS ARE INDICATED TENTATIVELY & SAME SHALL BE FINALIZED DURING DETAILED ENGINEERING.
11. DOUBLE LAYERED GANTRIES INDICATED AS (*) SHALL BE CONSIDERED FOR LINE TAKE OFF SUITABLE FOR CONNECTIVITY WITH MULTICIRCUIT DEAD END TOWERS.
12. ALL LA SHALL BE SILICONE RUBBER HOUSING TYPE.
13. PANEL ROOM OF 132KV GIS SHALL BE PLACED IN THE UPPER FLOOR OF 132KV GIS HALL.

FOR TENDER PURPOSE ONLY.

OWNER -		POWER GRID COMPANY OF BANGLADESH (PGCB)	
PROJECT -		DHAKA AND WESTERN ZONE TRANSMISSION GRID EXPANSION PROJECT (PROJECT 6)	
SUBSTATION		132/230V Dohar GIS NEW SUBSTATION	
TITLE		GENERAL ARRANGEMENT & ELECTRICAL LAYOUT PLAN	
DATE	PPPL	CHD	SCALE
MAR/2021			1:1000 (REV-1)
			09/03/21



CABLE CELLAR ROOM

GROUND FLOOR PLAN

Note:

- 1) Floor area and height of the building provided here are minimum required size. If larger size is required due to bidder's GIS specifications, the bidder may increase size of the building within the quoted price. No additional payment shall be made in this regard.
- 2) If transformers are positioned near the GIS building, due to fire safety reasons no window shall be provided on the transformer side of the building. But, if transformers are positioned sufficiently far from the GIS building, then windows shall be provided on the transformer side of the building.
- 3) Position and size of GIS equipments, cable ducts, loading platform, cable shaft, emergency exit stair etc. will be finalized during detail design.

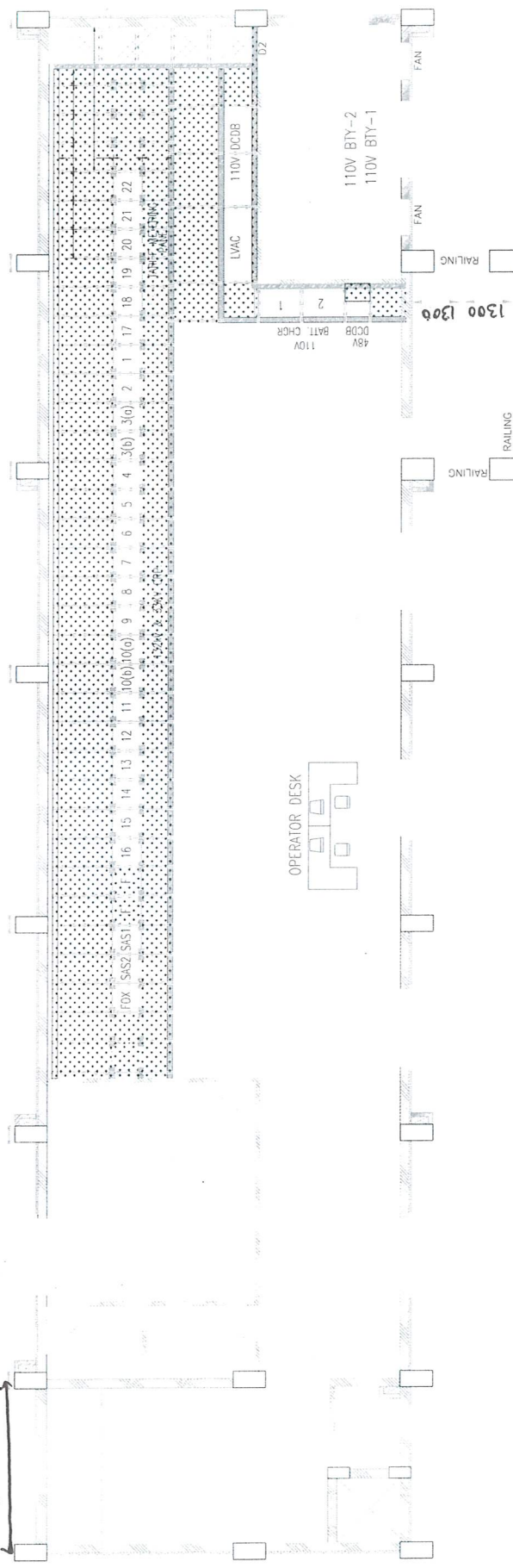
EMPLOYER	POWER GRID COMPANY OF BANGLADESH LTD.
PROJECT	
TITLE	230kV
Scale	N/S
Page	01

The drawing is Preliminary &
is for Bidding Purpose Only

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Handwritten initials

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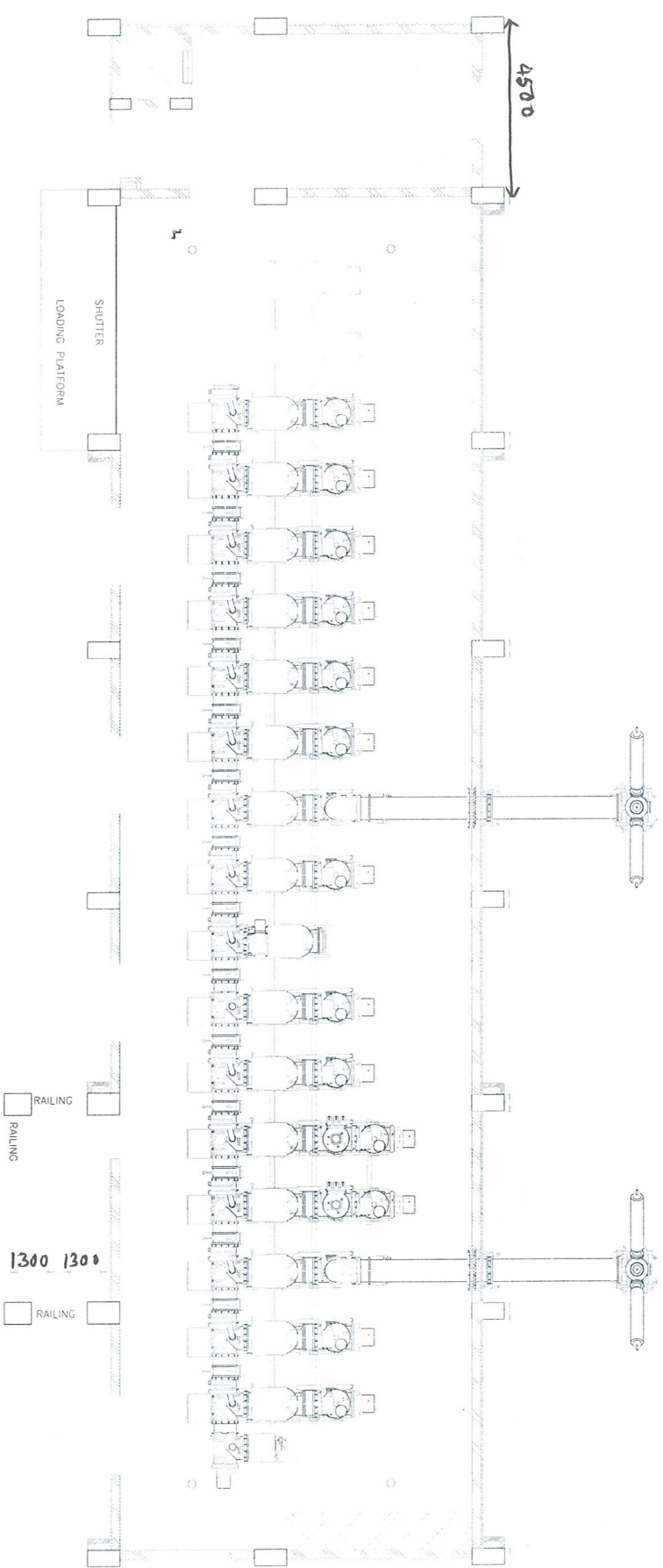
2ND FLOOR PLAN(1ST FLOOR+9000)

Note:

- 1) Layout of the control room floor will be finalized during detail design.

The drawing is Preliminary &
is for Bidding Purpose Only

EMPLOYER POWER GRID COMPANY OF BANGLADESH LTD.		PROJECT	
TITLE		DOCUMENT ID	
2304V		(rev-1)	
Page size A3	Scale NFS	Page 03	

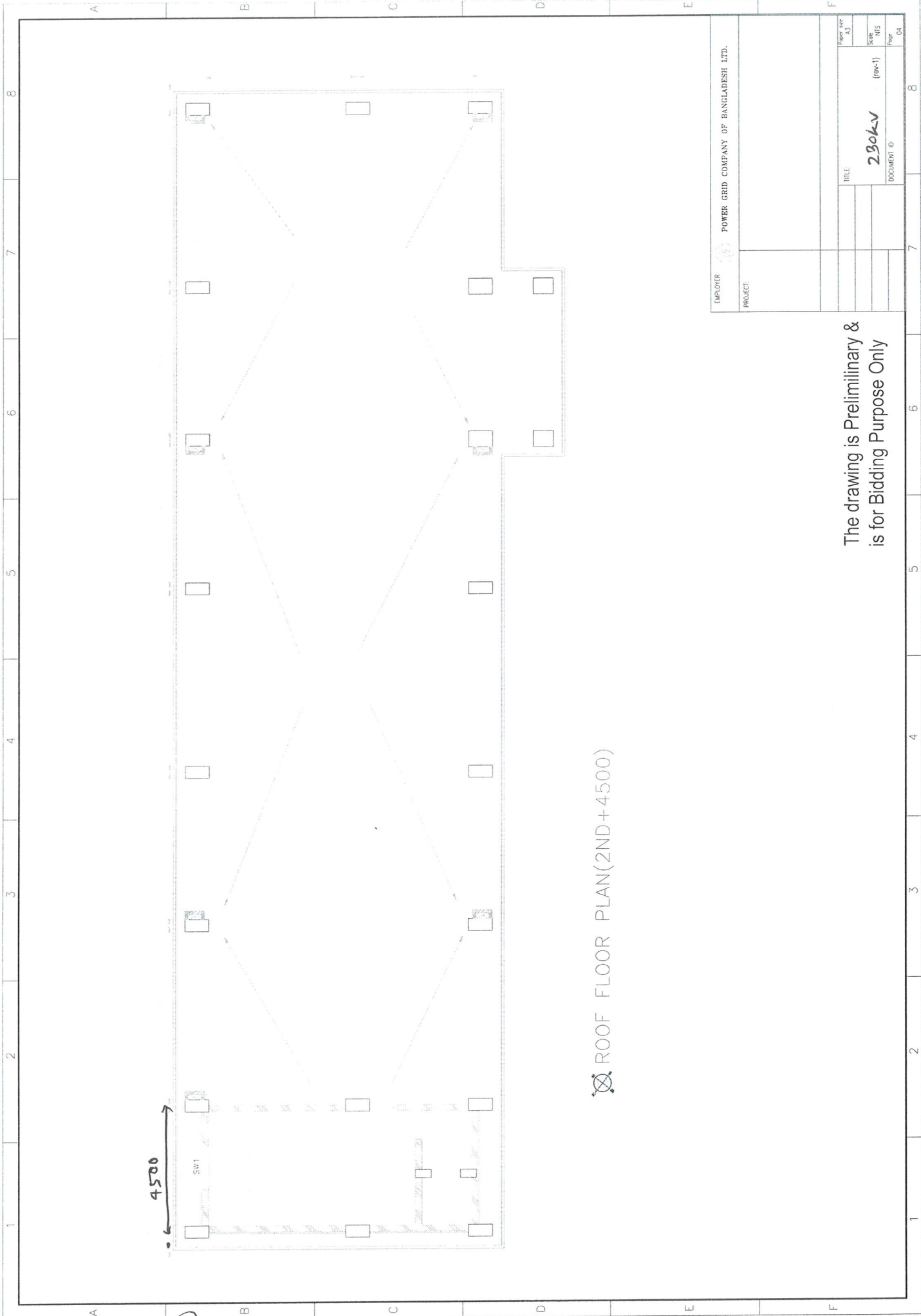


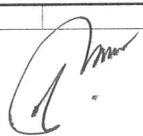
1ST FLOOR PLAN (GF + 3000)

- Note:**
- 1) Floor area and height of the building provided here are minimum required size. If larger size is required due to bidder's GIS specifications, the bidder may increase size of the building within the quoted price. No additional payment shall be made in this regard.
 - 2) If transformers are positioned near the GIS building, due to fire safety reasons no window shall be provided on the transformer side of the building. But, if transformers are positioned sufficiently far from the GIS building, then windows shall be provided on the transformer side of the building.
 - 3) Position and size of GIS equipments, cable ducts, loading platform, cable shaft, emergency exit stair etc. will be finalized during detail design.

The drawing is Preliminary & is for Bidding Purpose Only

EMPLOYER POWER GRID COMPANY OF BANGLADESH LTD.		TITLE 230KV (rev-1)		Project No. Page 02
PROJECT	CONTRACT NO.	Prepared	SJA	DOCUMENT ID
	Checked	SMS		
	Approved	PKD		
PROJECT		TITLE 230KV (rev-1)		Project No. Page 02

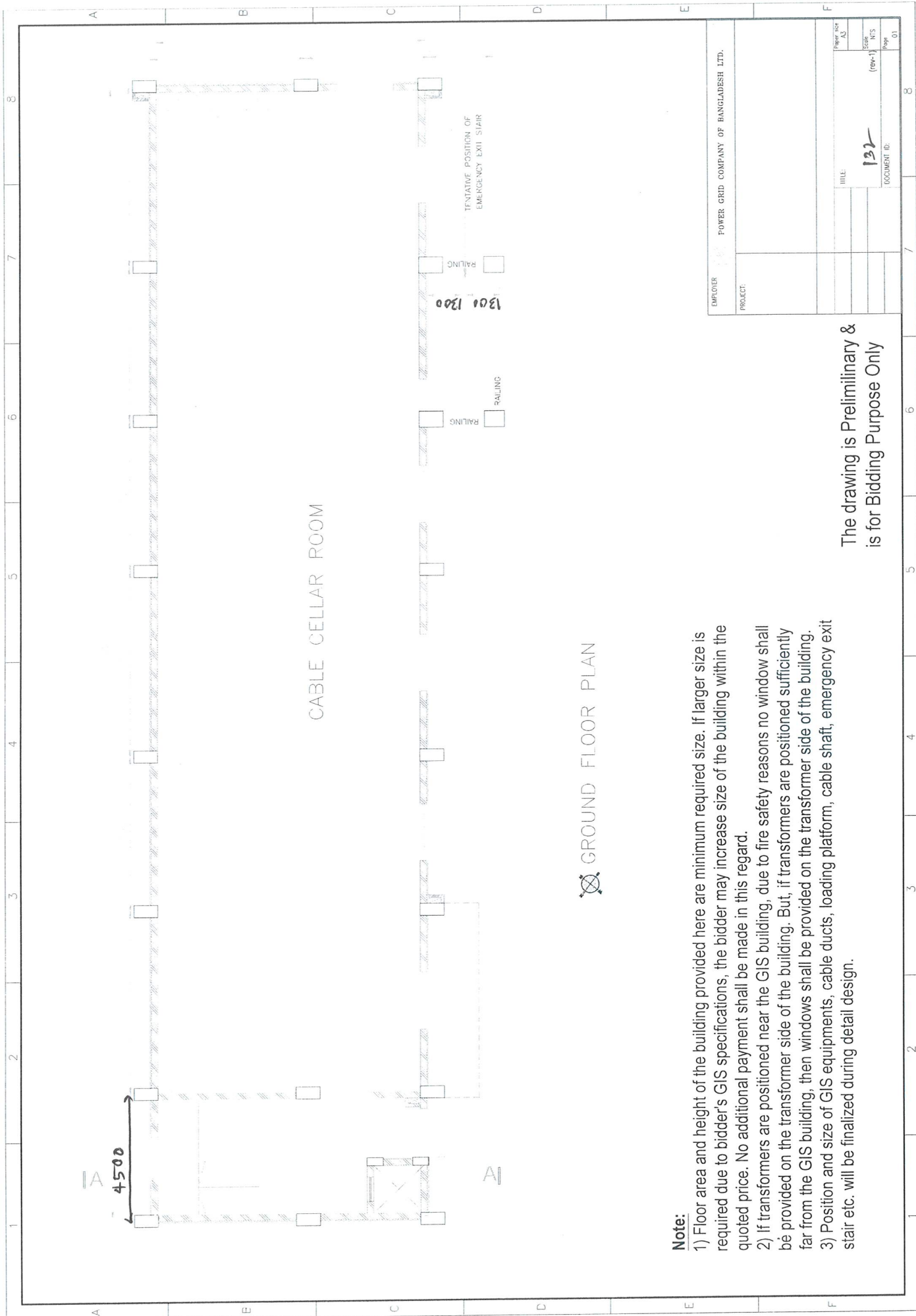



 802
 A

⊗ ROOF FLOOR PLAN(2ND+4500)

EMPLOYER  POWER GRID COMPANY OF BANGLADESH LTD.	
PROJECT:	
TITLE	
230kV (rev-1)	
Paper size A3	Scale NTS
DOCUMENT ID 04	

The drawing is Preliminary &
 is for Bidding Purpose Only



Note:

- 1) Floor area and height of the building provided here are minimum required size. If larger size is required due to bidder's GIS specifications, the bidder may increase size of the building within the quoted price. No additional payment shall be made in this regard.
- 2) If transformers are positioned near the GIS building, due to fire safety reasons no window shall be provided on the transformer side of the building. But, if transformers are positioned sufficiently far from the GIS building, then windows shall be provided on the transformer side of the building.
- 3) Position and size of GIS equipments, cable ducts, loading platform, cable shaft, emergency exit stair etc. will be finalized during detail design.

EMPLOYER POWER GRID COMPANY OF BANGLADESH LTD.

PROJECT

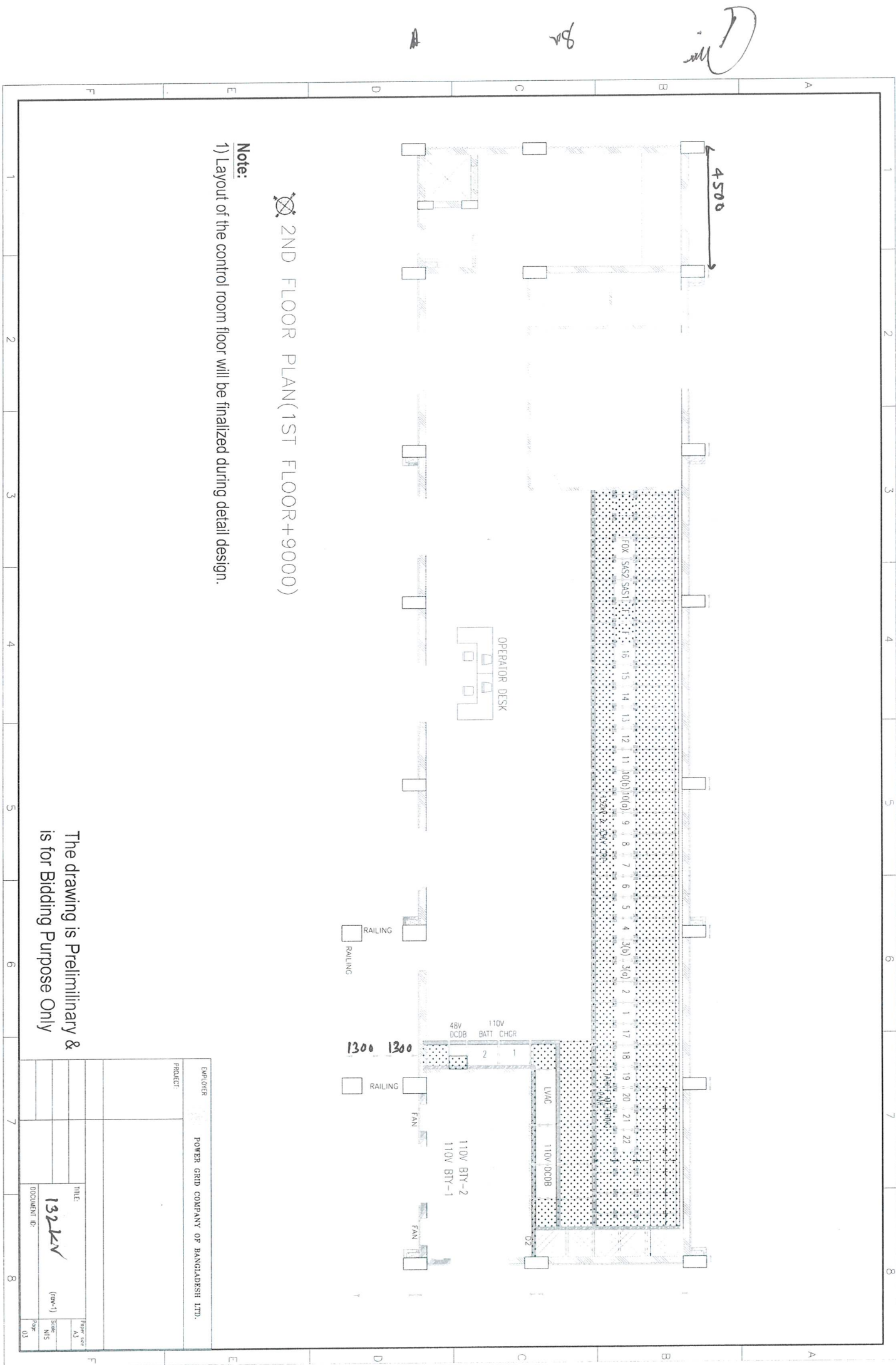
SCALE

1:20

DOCUMENT ID

Page 01

The drawing is Preliminary &
is for Bidding Purpose Only

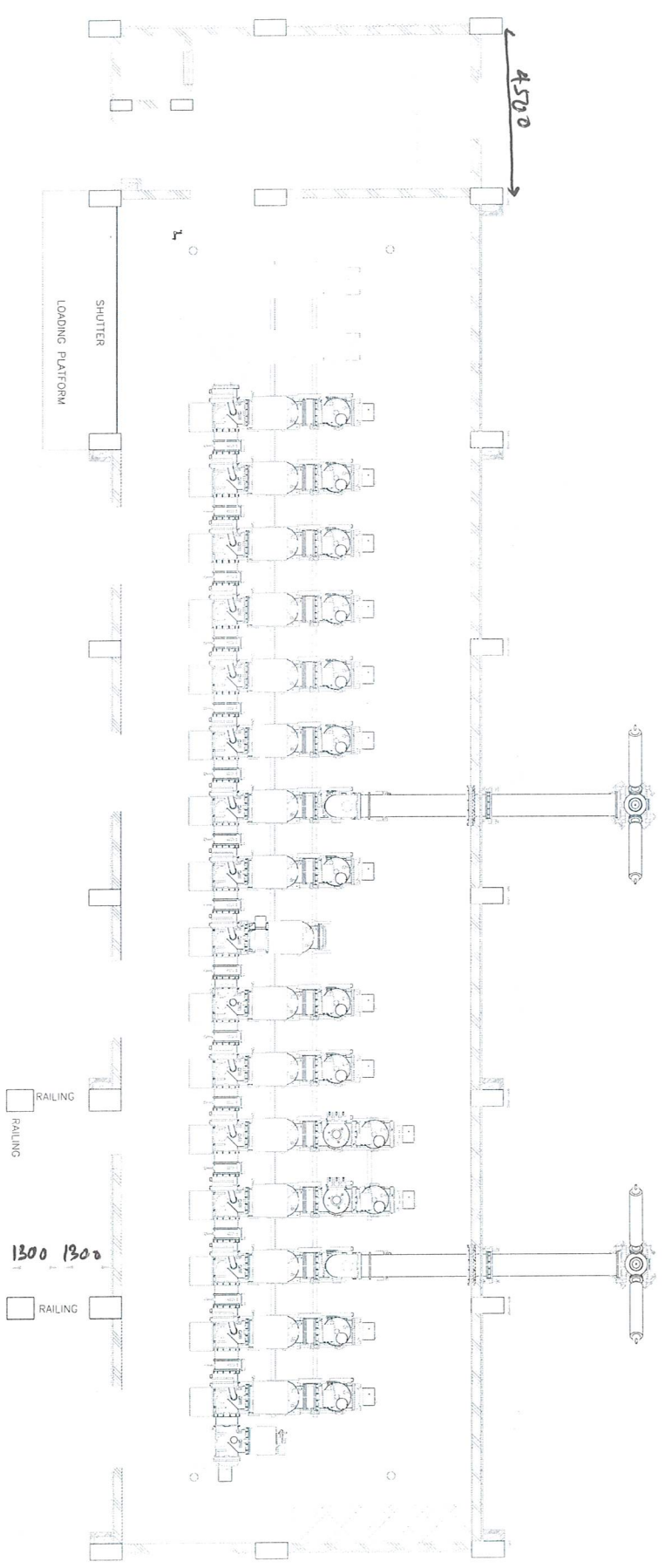


2ND FLOOR PLAN(1ST FLOOR+9000)

Note:
1) Layout of the control room floor will be finalized during detail design.

The drawing is Preliminary &
is for Bidding Purpose Only

EMPLOYER		POWER GRID COMPANY OF BANGLADESH LTD.	
PROJECT			
TITLE		132kV	
DOCUMENT ID:		(rev-1)	
		Scale	
		N/S	
		Type	
		0.5	



1ST FLOOR PLAN(GF+3000)

Note:

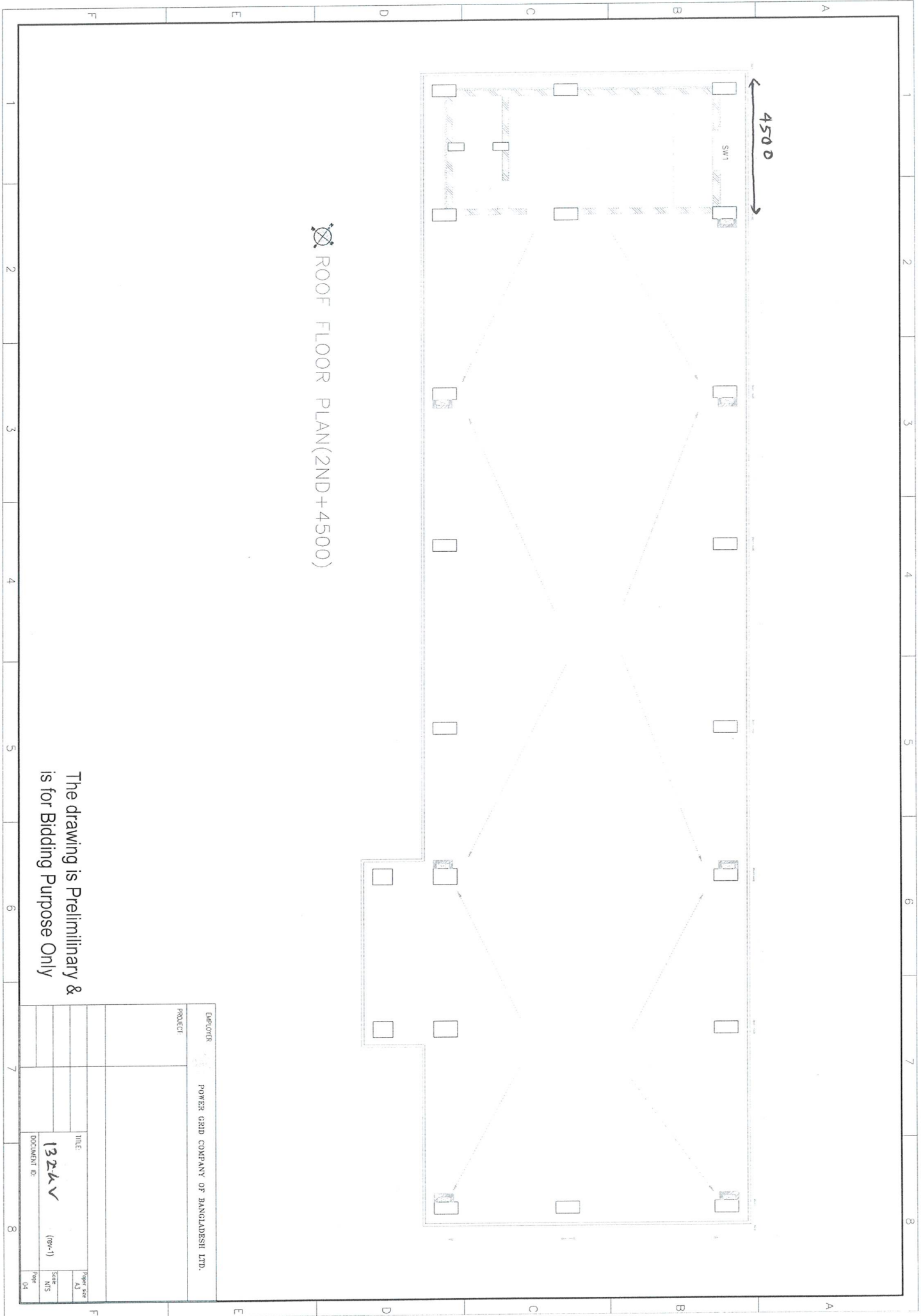
- 1) Floor area and height of the building provided here are minimum required size. If larger size is required due to bidder's GIS specifications, the bidder may increase size of the building within the quoted price. No additional payment shall be made in this regard.
- 2) If transformers are positioned near the GIS building, due to fire safety reasons no window shall be provided on the transformer side of the building. But, if transformers are positioned sufficiently far from the GIS building, then windows shall be provided on the transformer side of the building.
- 3) Position and size of GIS equipments, cable ducts, loading platform, cable shaft, emergency exit stair etc. will be finalized during detail design.

The drawing is Preliminary & is for Bidding Purpose Only

EMPLOYER POWER GRID COMPANY OF BANGLADESH LTD.		TITLE 132KV (rev-1)		Sheet size A3
PROJECT:		DOCUMENT ID:		Scale N.T.S
CONTRACT NO:		Prepared SUA		Page 02
		Checked SMS		
		Approved PMO		







 ROOF FLOOR PLAN(2ND+4500)

The drawing is Preliminary &
 is for Bidding Purpose Only

EMPLOYER		POWER GRID COMPANY OF BANGLADESH LTD.	
PROJECT			
TITLE		1324 ✓ (rev-1)	
DOCUMENT ID:		04	
Paper size		A3	
Scale		N.T.S	
Date		04	

ATTACHMENT-7

Untreated leatheroid and presspahn may be used for mechanical protection of winding insulation.

- 2.23.6 The use of asbestos is not permitted without the permission of the Engineer.
- 2.23.7 Wherever practicable, instrument, apparatus and machine coil windings, including wire wound resistors, with the exception of those immersed in oil or compound, shall be thoroughly dried in a vacuum or by other approved means and shall then be immediately impregnated through to the core with an approved insulating varnish. Varnish with a linseed oil base shall not be used.
- 2.23.8 No material of a hygroscopic nature shall be used for covering coils. Where inter-leaving between windings in coils is necessary, only the best manila paper, thoroughly dried, which permits penetration by the insulating varnish or wax, shall be used.
- 2.23.9 Polychlorinated Biphenyl (PCB) type materials shall not be used anywhere in the equipment or in any component.

2.24 Insulating Oil

Insulating oil shall comply with the requirements of IEC 60296. The Contractor shall provide at no additional cost any oil treatment facilities he may require for his own use in order to ensure that insulating oil meets the requirements of the specification.

2.25 Control and Selector Switches

- 2.25.1 Control switches shall be of the three-position type with a spring return action to a central

neutral position and without a locking feature. Circuit breakers shall have control switches which shall be labelled open/N/close or (O/N/I) and arranged to operate clockwise when closing the circuit breakers and anti-clockwise when opening them.

- 2.25.2 Control switches of the discrepancy type shall be provided where specified. Such discrepancy control switches shall be arranged in the lines of the mimic diagram. Such switches shall include lamps and be of the manually operated pattern, spring loaded such that it is necessary to push and twist the switch past its indicating position for operation.
- 2.25.3 The lamp shall be incorporated in the switch base and shall flash whenever the position of the controlled device is at variance with the position indicated by the control switch. Hand dressing of the control switch to the correct position shall cause the lamp to extinguish.
- 2.25.4 Pushbutton test switches shall be provided along the control panel that will illuminate all indicating discrepancy lamps as well as spare lamps on the control panels. The scheme shall be complete with all necessary diodes and other equipment required for satisfactory operation.
- 2.25.5 Switches for other apparatus shall be operated by pushbuttons, shrouded or well



ATTACHMENT-8

3.4.8 Surge Arresters (Gas type)

1. Surge arresters in GIS shall be of the type metal oxide arresters without gaps complete with surge counters and shall fulfill requirements as per IEC 60099-4, IEC 60099-5 and PGCB specification.

3.4.8.1 Not applicable

3.4.8.2 If the additional Surge Arresters are required different from the Surge Arresters proposed on the Single Line Diagrams, those Surge Arresters have to be provided free of charge and included in the final Bid price.

3.4.8.3 SF6 gas pressure monitors for the surge arresters shall comply with clause 3.3.1 and 3.3.7.

3.4.9 Bus bar (GIB)

1. The bus ducts shall be of the phase isolated or three phase enclosed type as required by design of manufacturer. However, phase isolated design is preferable for HV level (i.e., 230kV & above).

3.4.9.1 The SF6 enclosures shall be constructed from the same materials as the bus bar enclosures provided with the main GIS switchgear. The materials used shall prevent overheating at the specified rated currents. To reduce the effect of solar gain, all SF6 insulated bus duct exposed to direct sunlight may be covered with metallic sun shielding as per the Owner's request. The bus duct shall be complete with all components, enclosures, gas seals, gas monitors, gas compartments, gas filters, gas barrier and supporting insulators. The design of the bus ducts shall make full allowance of the thermal expansion associated with the switchgear, bushings and any other equipment between which the bus ducts are connected. The Contractor shall fully co-ordinate the requirements of the SF6 insulated bus duct connections between the GIS switchgear feeders and the overhead line landing gantries, especially with regards to the differential settlement of the concrete floors of the switchgear room and the bus duct supporting structures.

3.4.9.2 The bus ducts and their supports shall be designed and tested for the specified rated normal and short time currents and for the maximum system voltage and specified test voltages. The ducts and their supports shall include any nonmagnetic material or insulation necessary to prevent overheating or the induction of over-voltages in the secondary circuits.

3.4.9.3 The GIL shall be supplied & assembled by the manufacturer of GIS.



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ATTACHMENT-9

	1) At Local End Substation a) Modification of ADM with TP unit without booster each comprising - One (01) set Duplicate CPU - One (01) set Duplicate PSU - One (01) lot of Optical STM-16 ports for each direction of 230 kV line - One (01) lot of Optical STM-4 ports for each direction of 132 kV line-N/A - One (01) set of 16x2 Mbps (E1) card - One (01) set of card with minimum Eight ports 10/100 Base T LAN - One (01) set of card with minimum Eight ports 10/100 Base T Router - One (01) set of card with 20x2-w voice for FXS - One lot of Required no of cards with 4 commands for distance protection after detail design b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories g) Other accessories 2) Other Indoor equipment comprising of - One (01) set of PABX Card (FXO) - Two (02) sets of Primary phone (IP phone) (if required) - Ten (10) sets of Secondary phone (2W phone) (required) - One (01) lot of Extension of MDF - One (01) lot of Pigtail cables - One (01) lot of ODF 3) At remote end Substation – - One (01) lot of Optical STM-16 ports for 230 kV line at remote end(if required) - One (01) lot of Optical STM-16 ports for each 132 kV line at remote end (if required)- N/A - Required no.of cards with 4 commands for distance protection after detail design - One (01) lot of Outdoor termination box - One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
10.2	Outdoor equipment: Outdoor terminal box at gantry, Armoured Underground optical fibre cables (48 cores) from gantry of 230kV double circuit transmission line termination point to MDF (Main distribution structure at each Frame) to be installed in control room , pigtail cables with adequate length etc.
1P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Preferable country of origin of Testing Equipment shall be supplied from Germany, USA, UK and Japan. The materials shall have to be handed over to the designated store as per instruction of the Employer.

A sample tool list to be submitted for substation is as follows:

Serial No	Name	Quantity
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Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



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	i. One (01) lot of Optical STM-16 ports for 230 kV line at remote end(if required)-N/A ii. One (01) lot of Optical STM-16 ports for each 132 kV line at remote end (if required) iii. Required no.of cards with 4 commands for distance protection after detail design iv. One (01) lot of Outdoor termination box v. One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
20.2	Outdoor equipment:
	Outdoor terminal box at gantry, Armoured Underground optical fibre cables (48 cores) from gantry of 132kV double circuit transmission line termination point to MDF (Main distribution structure at each Frame) to be installed in control room , pigtail cables with adequate length etc.
2P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Preferable country of origin of Testing Equipment shall be supplied from Germany, USA, UK and Japan. The materials shall have to be handed over to the designated store as per instruction of the Employer.

A sample tool list to be submitted for substation is as follows:

Serial No	Name	Quantity
i.	Socket Wrench Set	1 Set
i.	Adjustable Wrench Set wiith Grip (6",8",12",15")	1 Set
i.	Ratchet Wrench Set	1 Set
i.	Open-endWrench Set	1 Set
i.	Ring/Ball Wrench Set	1 Set
i.	Pipe Wrench (12",18",24",	1 Set
i.	Allen Key Set	1 Set
i.	Hammer (1lb & 2lb)	1 Set
i.	Plier, 8 inch	1 No.
i.	Cutting Plier, 8 inch	1 No.
i.	Nose Plier, 8 inch	1 No.
i.	Screw Driver Set	1 Set
i.	Screw Driver (Star and Flat Big)	1 Set
i.	File (Flat)	1 No.
i.	File (Round)	1 No.
i.	Hakso Frame with blade	1 No.
i.	Safety Belt	4 Nos
i.	Ladder (Aluminium)	2 Nos.
i.	Helmet	6 Nos.
i.	Gas Cylinder Pipe Set	1 Set
i.	Multimeter (Fluke/Megger)	2 Nos
i.	Bucket	2 Nos.
i.	Shabol	2 Nos.

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



3P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer
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Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Preferable country of origin of Testing Equipment shall be supplied from Germany, USA, UK and Japan. The materials shall have to be handed over to the designated store as per instruction of the Employer.

A sample tool list to be submitted for substation is as follows:

Serial No	Name	Quantity
1.	Socket Wrench Set	1 Set
2.	Adjustable Wrench Set wiith Grip (6",8",12",15")	1 Set
3.	Ratchet Wrench Set	1 Set
4.	Open-endWrench Set	1 Set
5.	Ring/Ball Wrench Set	1 Set
6.	Pipe Wrench (12",18",24",	1 Set
7.	Allen Key Set	1 Set
8.	Hammer (1lb & 2lb)	1 Set
9.	Plier, 8 inch	1 No.
10.	Cutting Plier, 8 inch	1 No.
11.	Nose Plier, 8 inch	1 No.
12.	Screw Driver Set	1 Set
13.	Screw Driver (Star and Flat Big)	1 Set
14.	File (Flat)	1 No.
15.	File (Round)	1 No.
16.	Hakso Frame with blade	1 No.
17.	Safety Belt	4 Nos
18.	Ladder (Aluminium)	2 Nos.
19.	Helmet	6 Nos.
20.	Gas Cylinder Pipe Set	1 Set
21.	Multimeter (Fluke/Megger)	2 Nos
22.	Bucket	2 Nos.
23.	Shabol	2 Nos.
24.	Coppa	2 Nos
25.	Rope	200 m
26.	Duur Metal Box	1 No.
27.	Grinding Machine	1 No.
28.	Blower Machine	1 No.
29.	Mechanical Jug	1 No.
30.	Compressor Jug	1 No.
31.	Wire Cutter	1 No.
32.	Steel Cutter	1 No.
33.	Chain Pulley (2 Ton)	1 No.
34.	Vice Set	1 No.
35.	Drill Machine	1 No.

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



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	- Substation LAN system The equipment to be supplied, installed and commissioned shall be as shown on bid drawing. Supply of Indoor Fibre Optic Multiplexer Equipment at local and remote end substations each comprising: 1) At Local End Substation a) Modification of ADM with TP unit without booster each comprising - One (01) set Duplicate CPU - One (01) set Duplicate PSU - One (01) lot of Optical STM-16 ports for each direction of 230 kV line-N/A - One (01) lot of Optical STM-4 ports for each direction of 132 kV line - One (01) set of 16x2 Mbps (E1) card - One (01) set of card with minimum Eight ports 10/100 Base T LAN - One (01) set of card with minimum Eight ports 10/100 Base T Router - One (01) set of card with 20x2-w voice for FXS - One lot of Required no of cards with 4 commands for distance protection after detail design b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories g) Other accessories 2) Other Indoor equipment comprising of - One (01) set of PABX Card (FXO) - Two (02) sets of Primary phone (IP phone) (if required) - Ten (10) sets of Secondary phone (2W phone) (required) - One (01) lot of Extension of MDF - One (01) lot of Pigtail cables - One (01) lot of ODF 3) At remote end Substation – - One (01) lot of Optical STM-16 ports for 230 kV line at remote end(if required)-N/A - One (01) lot of Optical STM-16 ports for each 132 kV line at remote end (if required) - Required no of cards with 4 commands for distance protection after detail design - One (01) lot of Outdoor termination box - One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
40.2	Outdoor equipment:
	Outdoor terminal box at gantry, Armoured Underground optical fibre cables (48 cores) from gantry of 132kV double circuit transmission line termination point to MDF (Main distribution structure at each Frame) to be installed in control room , pigtail cables with adequate length etc.
4P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Preferable country of origin of Testing Equipment shall be supplied from Germany, USA, UK and Japan. The materials shall have to be handed over to the designated store as per instruction of the Employer.

A sample tool list to be submitted for substation is as follows:

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



[Handwritten signatures and initials]

	- 21 or 87 (built in 21) relay carrier signal (main and back-up) - SCADA data from switchgear and control system through SAS - Operator and Administrative telephone system - Substation LAN system The equipment to be supplied, installed and commissioned shall be as shown on bid drawing. Supply of Indoor Fibre Optic Multiplexer Equipment at local and remote end substations each comprising: 1) At Local End Substation a) Modification of ADM with TP unit without booster each comprising i. One (01) set Duplicate CPU ii. One (01) set Duplicate PSU iii. One (01) lot of Optical STM-16 ports for each direction of 230 kV line-N/A iv. One (01) lot of Optical STM-4 ports for each direction of 132 kV line v. One (01) set of 16x2 Mbps (E1) card vi. One (01) set of card with minimum Eight ports 10/100 Base T LAN vii. One (01) set of card with minimum Eight ports 10/100 Base T Router viii. One (01) set of card with 20x2-w voice for FXS ix. One lot of Required no of cards with 4 commands for distance protection after detail design b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories g) Other accessories 2) Other Indoor equipment comprising of i. One (01) set of PABX Card (FXO) ii. Two (02) sets of Primary phone (IP phone) (if required) iii. Ten (10) sets of Secondary phone (2W phone) (required) iv. One (01) lot of Extension of MDF v. One (01) lot of Pigtail cables vi. One (01) lot of ODF 3) At remote end Substation – i. One (01) lot of Optical STM-16 ports for 230 kV line at remote end(if required)-N/A ii. One (01) lot of Optical STM-16 ports for each 132 kV line at remote end (if required) iii. Required no.of cards with 4 commands for distance protection after detail design iv. One (01) lot of Outdoor termination box v. One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
50.2	Outdoor equipment:
	Outdoor terminal box at gantry, Armoured Underground optical fibre cables (48 cores) from gantry of 132kV double circuit transmission line termination point to MDF (Main distribution structure at each Frame) to be installed in control room , pigtail cables with adequate length etc.
5P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Preferable country of origin of Testing Equipment shall be supplied from Germany, USA, UK and Japan. The materials shall

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



	b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories g) Other accessories 2) Other Indoor equipment comprising of i. One (01) set of PABX Card (FXO) ii. Two (02) sets of Primary phone (IP phone) (if required) iii. Ten (10) sets of Secondary phone (2W phone) (required) iv. One (01) lot of Extension of MDF v. One (01) lot of Pigtail cables vi. One (01) lot of ODF 3) At remote end Substation – i. One (01) lot of Optical STM-16 ports for 230 kV line at remote end(if required)-N/A ii. One (01) lot of Optical STM-16 ports for each 132 kV line at remote end (if required) iii. Required no of cards with 4 commands for distance protection after detail design iv. One (01) lot of Outdoor termination box v. One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
6O.2	Outdoor equipment:
	Outdoor terminal box at gantry, Armoured Underground optical fibre cables (48 cores) from gantry of 132kV double circuit transmission line termination point to MDF (Main distribution structure at each Frame) to be installed in control room , pigtail cables with adequate length etc.
6P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Preferable country of origin of Testing Equipment shall be supplied from Germany, USA, UK and Japan. The materials shall have to be handed over to the designated store as per instruction of the Employer.

A sample tool list to be submitted for substation is as follows:

Serial No	Name	Quantity
1.	Socket Wrench Set	1 Set
2.	Adjustable Wrench Set wiith Grip (6",8",12",15")	1 Set
3.	Ratchet Wrench Set	1 Set
4.	Open-endWrench Set	1 Set
5.	Ring/Ball Wrench Set	1 Set
6.	Pipe Wrench (12",18",24",	1 Set
7.	Allen Key Set	1 Set
8.	Hammer (1lb & 2lb)	1 Set
9.	Plier, 8 inch	1 No.

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	multiplexer equipment at local and remote end substation with necessary works to interface with connecting substations is to be provided with the following minimum services: - 21(or 87 with built-in 21) relay for each transmission line protection (through fibre cores or backup PLC) - 21 or 87 (built in 21) relay carrier signal (main and back-up) - SCADA data from switchgear and control system through SAS - Operator and Administrative telephone system - Substation LAN system The equipment to be supplied, installed and commissioned shall be as shown on bid drawing. Supply of Indoor Fibre Optic Multiplexer Equipment at local and remote end substations each comprising: 1) At Local End Substation a) Modification of ADM with TP unit without booster each comprising i. One (01) set Duplicate CPU ii. One (01) set Duplicate PSU iii. One (01) lot of Optical STM-16 ports for each direction of 230 kV line-N/A iv. One (01) lot of Optical STM-4 ports for each direction of 132 kV line v. One (01) set of 16x2 Mbps (E1) card vi. One (01) set of card with minimum Eight ports 10/100 Base T LAN vii. One (01) set of card with minimum Eight ports 10/100 Base T Router viii. One (01) set of card with 20x2-w voice for FXS ix. One lot of Required no of cards with 4 commands for distance protection after detail design b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories g) Other accessories 2) Other Indoor equipment comprising of i. One (01) set of PABX Card (FXO) ii. Two (02) sets of Primary phone (IP phone) (if required) iii. Ten (10) sets of Secondary phone (2W phone) (required) iv. One (01) lot of Extension of MDF v. One (01) lot of Pigtail cables vi. One (01) lot of ODF 3) At remote end Substation – i. One (01) lot of Optical STM-16 ports for 230 kV line at remote end(if required)-N/A ii. One (01) lot of Optical STM-16 ports for each 132kV line at remote end (if required) iii. Required no.of cards with 4 commands for distance protection after detail design iv. One (01) lot of Outdoor termination box v. One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
70.2	Outdoor equipment:
	Outdoor terminal box at gantry, Armoured Underground optical fibre cables (48 cores) from gantry of 132kV double circuit transmission line termination point to MDF (Main distribution structure at each Frame) to be installed in control room, pigtail cables with adequate length etc.
7P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

Section-II Mandatory Spares, Maintenance tools & Test Equipment:

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



	viii. One (01) set of card with minimum Eight ports 10/100 Base T Router (if required) ix. One (01) set of card with 20x2-w voice for FXS (if required) x. One lot of Required no of cards with 4 commands for distance protection after detail design b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board (if required) f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories (if required) g) Other accessories (if any) 2) Other Indoor equipment comprising of i. One (01) set of PABX Card (FXO) ii. Two (02) sets of Primary phone (IP phone) (if required) iii. Ten (10) sets of Secondary phone (2W phone) (required) iv. One (01) lot of Extension of MDF v. One (01) lot of Pigtail cables vi. One (01) lot of ODF 3) At remote end Substation – i. Optical STM-16 ports for 400 kV line at remote end-NA ii. Optical STM-16 ports for each 132 kV line at remote end iii. One(01) lot of Required no. of cards with 4 commands for distance protection after detail design iv. One (01) lot of Outdoor termination box v. One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
802	Outdoor equipment:
	A lot of Armoured Underground Optical Fibre (48 cores) cables from terminal box at gantry structure to MDF (Main distribution Frame) shall be designed, supplied, delivered, installed, tested and commissioned, including supply and installation of MDF and digital cables, for required part of substation each comprising of – i. One (01) lot of Underground optical fiber cable, armoured, 48 core ii. One (01) lot of Outdoor termination box
8P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

1.3.9 Technical Requirements for GIS extension of existing 132/33KV Niyamatpur Substation

Description of Works:

An existing 132/33 kV AIS substation at Niyamatpur shall be connected to existing Patnitola 132/33 kV substation through Niyamatpur-Patnitola 132 kV double circuit line (using single Grosbeak equivalent ACCC conductor with an approximate length of 32.5 km).

The control room has enough space. Auxiliary power supply is available.

The **scope of work** under this turnkey contract is design, supply, delivery, installation, testing & commissioning of:

230kV Gas Insulated Switchgear (GIS) and Switch Yard:

Deleted

230kV Air Insulated Switchgear (GIS):

Deleted

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



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	iv. Optical STM-16 ports for each direction of 230 kV line – N/A v. One (01) lot of Optical STM-4 ports for each direction of 132 kV line vi. One (01) set of 16x2 Mbps (E1) card (if required) vii. One (01) set of card with minimum Eight ports 10/100 Base T LAN (if required) viii. One (01) set of card with minimum Eight ports 10/100 Base T Router (if required) ix. One (01) set of card with 20x2-w voice for FXS (if required) x. One lot of Required no of cards with 4 commands for distance protection after detail design b) One (01) lot of Optical Booster (if required) c) One (01) set of IDF/SDF d) One (01) lot of Cables e) One (01) lot of EOW telephone with board (if required) f) One (01) lot of Panel including wiring, lighting, filtering fan, humidity controller, heater, power socket & other accessories (if required) g) Other accessories (if any) 2) Other Indoor equipment comprising of i. One (01) set of PABX Card (FXO) ii. Two (02) sets of Primary phone (IP phone) (if required) iii. Ten (10) sets of Secondary phone (2W phone) (required) iv. One (01) lot of Extension of MDF v. One (01) lot of Pigtail cables vi. One (01) lot of ODF 3) At remote end Substation – i. Optical STM-16 ports for 400 kV line at remote end-NA ii. Optical STM-16 ports for each 132 kV line at remote end iii. One(01) lot of Required no. of cards with 4 commands for distance protection after detail design iv. One (01) lot of Outdoor termination box v. One (01) lot of Cables BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
902	Outdoor equipment: A lot of Armoured Underground Optical Fibre (48 cores) cables from terminal box at gantry structure to MDF (Main distribution Frame) shall be designed, supplied, delivered, installed, tested and commissioned, including supply and installation of MDF and digital cables, for required part of substation each comprising of – i. One (01) lot of Underground optical fiber cable, armoured, 48 core ii. One (01) lot of Outdoor termination box
9P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

1.3.10 Technical Requirements for AIS extension of existing 400/230/132 Kv Substation at Gopalganj(N) Substation

Description of Works:

An existing 400/230/132 AIS substation is Gopalganj(N). Gopalganj(N) shall be connected to the Shibchar a new 132/33kV substation under this project of PGCB through Shibchar-Gopalganj(N) double circuit 230kV line at Shibchar, initially charged at 132KV (using Twin Mallard equivalent ACCC conductor with an approximate length of 25 km with 0.4 river crossing).

The control room has enough space. Auxiliary power supply is available.

The **scope of work** under this turnkey contract is design, supply, delivery, installation, testing & commissioning of:

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



	- BOQ shall be finalized at the time of execution with the consent of Communication Circle, PGCB.
1002	Outdoor equipment:
	A lot of Armoured Underground Optical Fibre (48 cores) cables from terminal box at gantry structure to MDF (Main distribution Frame) shall be designed, supplied, delivered, installed, tested and commissioned, including supply and installation of MDF and digital cables, for required part of substation each comprising of – i. One (01) lot of Underground optical fiber cable, armoured, 48 core ii. One (01) lot of Outdoor termination box
10P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

1.3.11 Technical Requirements for GIS extension of existing 132/33 kV Substation at Purbasadipur Substation

Description of Works:

An existing GIS substation at Purbasadipur shall be connected to new Domar substation through Purbasadipur -Domar double circuit 230kV line at Domar, initially charged at 132KV (using Twin Mallard equivalent ACCC conductor with an approximate length of 46.5 km).

The control room has enough space. Auxiliary power supply is available.

The **scope of work** under this turnkey contract is design, supply, delivery, installation, testing & commissioning of:

230kV Gas Insulated Switchgear (GIS) and Switch Yard:

Deleted

230kV Air Insulated Switchgear (GIS):

Deleted

132kV Gas Insulated Switchgear (GIS):

- Two(2) nos of GIS line bay extension.
- Two(2) nos of GIS line bay extension shall be terminated at 230KV side gantry and hooked up at 132KV GIS by HV cable.
- Extension of 132kV Bus (Bus shall be extended considering there shall be provision for entering two-line bays.)
- The configuration of the 132kV busbar shall be Double Main Bus scheme.

33kV Air Insulated Switchgear (AIS):

Deleted

Transformer:

Deleted

Control, Protection, Substation Automation & Metering:

Associated control, metering, protection equipment, synchronizing scheme for the 132KV bay extension under this project.

Earthing & Lightning Protection:

Extension & modification of design, supply, delivery, installation, testing & commissioning of earthing & lightning protection for the present scope of work.

Digital Fault & Disturbance Recorder (DFDR):

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bhola and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



	A lot of Armoured Underground Optical Fibre (48 cores) cables from terminal box at gantry structure to MDF (Main distribution Frame) shall be designed, supplied, delivered, installed, tested and commissioned, including supply and installation of MDF and digital cables, for required part of substation each comprising of – i. One (01) lot of Underground optical fiber cable, armoured, 48 core ii. One (01) lot of Outdoor termination box
11P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

1.3.12 Technical Requirements for GIS extension of existing 132/33 kV Substation at Bhandaria Substation

Description of Works:

The Bhandaria 132/33kV substation is an existing substation under this project of PGCB shall be connected to new 132/33KV Pirojpur grid substation through double circuit 132kV line at Bhandaria (using single grosbeak equivalent ACCC conductor with an approximate length of 49.5 km with 1m kacha river crossing & 300m Bhirab river crossing).

The control room has enough space. Auxiliary power supply is available.

The **scope of work** under this turnkey contract is design, supply, delivery, installation, testing & commissioning of:

230kV Gas Insulated Switchgear (GIS) and Switch Yard:

Deleted

230kV Air Insulated Switchgear (GIS):

Deleted

132kV Gas Insulated Switchgear (GIS):

- Two(2) nos of GIS line bay extension
- Extension of 132kV Bus (Bus shall be extended considering there shall be provision for entering two-line bays.)
- **The configuration of the 132kV busbar shall be Double bus bar scheme. The existing busbar is Main & transfer Bus scheme.**

33kV Air Insulated Switchgear (AIS):

Deleted

Transformer:

Deleted

Control, Protection, Substation Automation & Metering:

Associated control, metering, protection equipment, synchronizing scheme for the 132KV bay extension under this project.

Earthing & Lightning Protection:

Extension & modification of design, supply, delivery, installation, testing & commissioning of earthing & lightning protection for the present scope of work.

Digital Fault & Disturbance Recorder (DFDR):

Deleted

Fibre Optic Multiplexer Equipment for Communication and Protection:

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bholu and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



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12O2	Outdoor equipment:
	A lot of Armoured Underground Optical Fibre (48 cores) cables from terminal box at gantry structure to MDF (Main distribution Frame) shall be designed, supplied, delivered, installed, tested and commissioned, including supply and installation of MDF and digital cables, for required part of substation each comprising of – i. One (01) lot of Underground optical fiber cable, armoured, 48 core ii. One (01) lot of Outdoor termination box
12P	One (1) lot of installation of slack span under supervision of master installer with ACCC conductor & OPGW and necessary fittings supplied by employer

1.4 Detailed Description of the Scope of Supply for Tele-communication System

The communication part of the project shall provide the interconnection between all substations involved in this package of the Project:

- 1) NEW 230/33 kV GIS SS at Bhlola
- 2) NEW 132/33 kV GIS SS at Hatibandha
- 3) NEW 132/33 kV GIS SS at Pirojpur
- 4) NEW 132/33 kV GIS SS at Bhanga
- 5) NEW 132/33 kV GIS SS at Jhalokati
- 6) NEW 132/33 kV GIS SS at Shibchar
- 7) NEW 132/33 kV GIS SS at Domar
- 8) Extension at Patnitala 132/33 kV AIS SS
- 9) Extension at Niyamatpur 132/33 kV AIS SS
- 10) Extension at Gopalganj 400/230/132 kV AIS SS
- 11) Extension at Purabasadipur 132/33 kV GIS SS
- 12) Extension at Bhandaria 132/33 kV GIS SS

The purpose of the telecommunication system is to provide all the necessary telecommunication channels for the following sub-systems:

- SCADA for data exchange between the substations and the National Load Despatch Centre (NLDC) by two communication technologies i.e. LAN & WAN
- Tele-protection to enable the communication between line differential protection relays and between distance protection relays,
- Telephone to enable telephone communication between the substations and NLDC,
- Metering: Data transfer between meters and the entity in charge of collecting and processing metering data,
- Any other telecommunication channels.

characteristics shall be define during the Design stage and there will be subject of the Employer's approval.

1.4.1 Recommendation of Communication system

Telecom equipment (Optical Transmission and ADD/DROP MUX)

- STM-16/64 / 10G or 100G / DWDM
 - MPLS (Layer-3)
- ADD/DROP Multiplexer (PDH)

Bid Document (V-3): Design, Supply, Installation, Testing and Commissioning of 230/33 kV GIS Substation at Bholala and 132/33 kV GIS Substations at Domar, Hatibandha, Shibchar, Bhanga, Jhalokathi, Pirojpur on Turnkey Basis (Package-8).



ATTACHMENT-10

All documents, tables and rating plates attached to the equipment shall be in English language.

3.5.1.31 Portable Lightning Arrester Diagnostic System (PLADS) (not applicable)

Contractor shall provide two PLADS (one per S/S) to diagnose of the aging state of lightning arrester for condition test and MRE. The specification of PLADS is as follows:

- i) Such diagnosis items are able to be measured.
- ii) Total leakage current
- iii) Resistive leakage current
- iv) Harmonics (3rd, 5th, 7th, 9th) current
- v) Detected sensor shall be a CT sensor.
- vi) The electric field shall be reduced in a shielding case.
- vii) HMI shall be provided for analyzing the data

3.5.2 HVAC Circuit Breakers

This specification of technical conditions and technical requirements for Circuit Breakers covers the ratings, design, equipment requirements, inspection and testing of the equipment. Here are stated only those general aspects that are meant to ensure minimum requirements with respect of quality and performance. Other details and specific data are contained in the Technical Data Schedules. Properties, testing and ratings of the equipment shall at least conform to the latest edition of the relevant IEC and British standards. The Contractor is obliged to provide complete equipment, even if the details are not mentioned specifically in the following specifications.

1. General Design

- 3.5.2.1.1 Circuit breaker shall be, for outdoor installation. The circuit breaker shall be with SF6 gas as the arc-quenching and insulating medium. The circuit breakers shall comply with the requirements of IEC 60273, IEC 60694, IEC 60815, IEC 62271-100.
- 3.5.2.1.2 Beside the rated short circuit breaking current, the circuit breakers shall be capable of making and breaking the excitation all currents, without restricting and generating harmful over-voltage.
- 3.5.2.1.3 Circuit breakers with two breaking chambers shall be constructed to provide voltage distribution per breaking unit not above 55 % of the total voltage, at any circumstances.
- 3.5.2.1.4 The Contractor shall provide and deliver suitable horizontal and vertical supporting structure that shall be galvanized.

3.5.2.2 Operating Mechanism

- 3.5.2.2.1 The operating mechanism shall be of motor wound-spring charged type. Other type operating mechanism is not allowed. Operating mechanism shall be of maintenance free type.
- 3.5.2.2.2 Operating mechanisms housing shall be made of aluminium or stainless steel. Anticorrosion protection is not anticipated.



ATTACHMENT-11

Current Transformer 33 kV,

Current Transformer 33 kV,				
No.	Description	Minimum Requirements		Guaranteed
		Unit	Data	
1.	Current Transformers - General			
1.1.	Manufacturer		Insert	
1.2	Type		Insert	
1.3	Model designation		Insert	
1.4	Country of origin		Insert	
1.5	Standards		IEC 60044-1	
1.6	Quality control		ISO 9001	
1.7	Type		Outdoor, post type	
2.	Current Transformers - Characteristics			
2.1	Nominal system voltage	kV rms	33	
2.2	Highest voltage for equipment Un	kV rms	36	
2.3	Rated lightning impulse withstand voltage	kV peak	170	
2.4	Rated short duration power frequency voltage	kV	70	
2.5	Rated frequency fr	Hz	50	
2.6	Rated short-time thermal current Ith, 1 s	kA	31.5	
2.7	Rated dynamic current Idyn	kV peak	80	
2.8	Rated continuous thermal current (40°C):			
	I core	% In	200	
	II core	% In	200	
	III core	% In	120	
2.9	Rated transformer ratio:			
	I core	A/A	As per Volume-3, Schedule-A	
	II core	A/A		
	III & IV core	A/A		
2.10	Accuracy class:			
	I core		As per Volume-3, Schedule-A	
	II core			
	III & IV core			
2.11	Security factor:			
	I core		Fs=10	
	II core		Fs=10	
2.12	Rated power:			
	I core	VA	As per Volume-3, Schedule-A	
	II core	VA		
	III & IV core	VA		
				(Calculation required on design stage)
3.	Current Transformers - Design and Construction			
3.1	Insulator material		Composite/ porcelian	
3.2	Insulating medium		RIP	
3.3	Minimum creepage distance	mm/kV	Min. ≥ 25 mm/kV	
3.4	Max. radio interference voltage at 0.5-2 MHz (acc. IEC 60694)	µV	Max. 2500	

