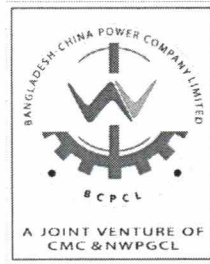


BANGLADESH-CHINA POWER COMPANY (PVT.) LIMITED



Bidding Documents

for

Design, Supply, Installation, Testing & Commissioning of Payra – Gopalganj – Aminbazar 400kV Double Circuit Transmission Line (2nd Phase) on Turnkey Basis

Volume 3

Bid Prices and Schedules

Memo No. : 1258/BCPCL/Payra/2020
Date : December 14, 2020
Deadline for Tender Submission : February 04, 2021 @ 12.00 hours Local Time
(GMT +6 hours)



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SCHEDULE A: INTRODUCTION AND PREAMBLE TO THE PRICE AND TECHNICAL SCHEDULES

BRIEF DESCRIPTION OF THE WORKS

The bidder shall be deemed to have visited site, inspected, gathered data and verified details of the as-built system in order to design, supply and interface their new equipment. All necessary materials, adjustments, dismantling, remedial and tidying-up work in order to complete the work specified shall be included in the contract price. **The contractor is responsible for ensuring that all and/or any item(s) of work required for the safe, efficient and satisfactory completion and functioning of the works, are included in the Bid Price whether they be described in the specification or not.**

The scope of work comprises the following: -

DESCRIPTION OF WORKS

1. Extension of Gopalganj 400/230/132kV AIS Substation and Aminbazar 400/230/132kV AIS Substation

The scope of work under this turnkey Bid is design, supply, delivery, installation, testing & commissioning of a new Air Insulated Switchgear (AIS) bays at Gopalganj and Aminbazar substations. The configuration of the 400 kV busbar shall be 1 and ½ busbar scheme.

The scope of work also includes extension of associated control, protection, fiber optic multiplexer equipment for communication & protection, substation automation, digital fault & disturbance recorder (DFDR), station power facilities (if needed), including towers and gantry structures, one (1) 400 kV Switchyard Panel Rooms (SPR) in Aminbazar Substation to accommodate protection and control IED and associated equipment, local control kiosks, internal roads, and all other necessary substation facilities and supply of mandatory spare parts and maintenance & special tools.

The scope of works shall also include two (2) Three-Phase Shunt Reactors with its size for each line and associated air-insulated switchgears including all necessary works and services if the EMTP study result confirms the shunt reactors are necessary. The details of EMTP study that shall be performed by the Contractor is specified in Section II, Clause 16, Volume 2 of 3 of the Bidding Documents.

The scope of work may also include the insulation co-ordination based on EMTP study with surge arresters, Point-on-Wave device, and PIRs for each busbar and associated air-insulated switchgears. The scope of works includes all necessary works and services if the EMTP study result confirms surge arresters, Point-on-Wave, and PIR are necessary to mitigate surges to transmission lines, busbars, and transformers.

400 kV Air Insulated Switchgears (AIS)

Gopalganj 400/230/132 kV AIS Substation:

New 400 kV AIS switchyard for four (4) 400 kV line bays to connect two 400 kV double circuit overhead lines (Payra 3 & 4 and Aminbazar 3 & 4), two (2) 400 kV bus-tie bays, and two (2) Shunt Reactors for Payra 3 & 4 line (based on EMTP study).



Aminbazar 400/230/132kV AIS Substation:

New 400 kV AIS switchyard for two (2) 400 kV line bays to connect one 400 kV double circuit overhead line (Gopalganj 3 & 4), and two (2) 400 kV bus-tie bays.

Control, Protection, Substation Automation, Metering & DFDR

Extension of associated local & remote control panel, metering panel, protection equipment, synchronizing scheme and substation automation system (SAS) & DFDR for complete substation. Monitoring of status of Bus PT & Bus ES need to be included in the SAS. Necessary works to be performed so that Air temperature in the SPRs can be controlled and monitored through SAS.

Fibre Optic Multiplexer Equipment for Communication and Protection

Extension of indoor type Fibre Optic Multiplexer and digital PABX Equipment for protection & communication.

DC and LVAC System

Extension of DC and LVAC system with all necessary materials required for the plant being installed for 110 V DC battery & battery charger, 48 V DC battery & battery charger, DC distribution board and LVAC distribution board.

Civil Works, Building and Foundation

Complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads; cable trenches, fences, including earthing & lightning protection, switchyard lighting, etc.

Complete design, supply and construction of all civil items including all necessary architecture & structural requirements; cable trays, fittings and flooring & finishes; air-conditioning and lighting for two new one storied local control houses in 400 kV switchyard.

SCADA system for Telecontrol and Telemetry

Complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetry facilities required at the existing National Load Dispatch Center (NLDC) at Rampura for integration of the 400 kV extensions. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, etc. shall be controlled from NLDC through the Gateway of the substation automation system using IEC 60870-5-101 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.

Mandatory Spares, Erection & Test Equipment

Supply of complete mandatory spare and spare parts of switchgear, control equipment, protection relays, meters, erection, and test equipment. Test equipment is to be supplied from Europe, USA, Japan or equivalent origin. Printed catalogue, operation and service manual are to be provided. The materials shall have to be handed over to the designated store as per instruction of the Engineer.



Works and Equipment for Shunt Reactor Installation

Two (2) 400 kV three phase Shunt Reactors ONAN (Size: 20 MVAR or 25 MVAR or 30 MVAR or 35 MVAR as per the EMTP study to be done by the Contractor) and associated switchgears including all necessary works and services as specified in Section II, Clause 16, Volume 2 of 3 of the Bidding Document.

2. Training and Inspection:

The Contract Price shall include all costs of training & inspection of Employers and the instruction of staff on site for the following:

- (a) **International Training:** The following engineers nominated by the Employer shall be provided with training at specialist manufacturer's works as follows:

SL	Description	No. of Engineer	Duration (Week)
1.	Control, protection & SAS	3	3
2.	HV AIS Substation & Equipment Design & Testing	3	2
3.	Operation and maintenance of HV AIS substation equipment	2	2

- (b) **International Witnessing:** The following engineers nominated by the Employer shall participate in the inspection and witnessing of factory acceptance tests at manufacturers' works as follows:

SL	Description	No. of Engineer	Duration (Working Days)
1.	Circuit Breaker	03	07
2.	Shunt Reactor	02	05
3.	Disconnecter	02	05
4.	Instrument Transformer (1 for CT & 1 for PT)	02	05
5.	Lightning Arrester	02	05

- (c) **Local Training:** On-site instruction by the manufacturer's engineer on operations and maintenance of the (i) HV switchgears & transformers (ii) protection & Substation automation system (iii) fiber optic multiplexer for a period of two (2) weeks and for fifteen (15) BCPCL engineers in each program.

The Contractor shall be responsible for bearing all costs for the trainees (for item (a)+(b)), including air fares, accommodation, meal, healthcare, transportation, visa fees etc. together with payment of a daily allowance of **US\$ 150** for each of the Employer's trainee. The Employer's engineer attending the Pre-shipment inspection (as mentioned in item no.(c)) shall be provided with the same facilities.

Note: The Contractor shall have to submit the Schedule of each Training & FAT and taken approval from the Employer prior to each Training & FAT. The International training shall have to be arranged within one (1) year from the date of contract signing.



REQUIREMENTS**Section-I Gopalganj 400/230/132 kV AIS Substation and Aminbazar 400/230/132 kV AIS Substation**

The equipment to be designed, supplied, installed, tested & commissioned as stipulated in bid specification and shown in bid drawings (Volume 2 of 3):

Item	Description
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1A	420 kV Air Insulated Switchgear (AIS)
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	The 420 kV AIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and shall comprise the following:
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1A1	Two (2) sets of 420 kV, 4000 A, 63 kA/1sec, 50 Hz, 1425 kVp BIL, live tank type, gang operated , SF6 gas circuit breakers with spring-stored energy operating mechanism. PIR/CSD (Control Switching Device) is required for line, shunt reactor & transformer switching which shall have to be considered for 400kV circuit breaker.
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1A2	Eight (8) sets of 420 kV, 4000 A, 63 kA/1sec, 50 Hz, 1425 kVp BIL, live tank type, single-pole operation , SF6 gas circuit breakers with spring-stored energy operating mechanism. PIR (Pre insertion resistor) is required for line switching which shall have to be considered for 400 kV circuit breaker.
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	[For line switching, Pre insertion resistor (PIR) is also acceptable instead of control switching device. In this case of line & transformer switching with same breaker (i.e. Mid breaker), combination of PIR & CSD is required]
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1A3	Six (6) sets of 420 kV, 4000 A, 63 kA/1sec, 50 Hz, 1425 kVp BIL, horizontal double break, post type, motor operated disconnectors with motor-operated earthing switch .
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1A4	twenty (20) sets of 420 kV, 4000 A, 63 kA/1sec, 50 Hz, 1425 kVp BIL, horizontal double break, post type, motor operated disconnectors without earthing switch .
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1A5	Not Used
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1A6	Forty-two 42 nos. of single-phase, 6-core, 420 kV, 63 kA/1sec, 4000/1A, 50 Hz, 1425 kVp BIL, post type current transformer.
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1A7	Eighteen (18) nos. of single-phase, 3-core, 420 kV, 63 kA/1sec, 50 Hz, 1425 kVp BIL, capacitor type voltage transformers.
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1A8	Eighteen (18) nos. of 390 kV rated voltage, 303 kV(rms) continuous operating voltage at 50°C, 10 kA nominal discharge current, 50 Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters.
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1A9	Sixteen (16) nos. of wave trap (single phase, 420 kV, 4000 A, 1 mH).
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- 1A10 Two (2) lots of 420 kV post type support insulators required for completing 420 kV busbar and switchgear as specified in the technical specifications and bid drawings.
- 1A11 Two (2) lots of rigid tubular bus [Aluminium of grade 63401 WP], flexible conductors, insulators, fittings including all necessary clamps and connectors required for completing 420 kV busbar and switchgear connection as specified in the technical specifications and bid drawings.
- 1A12 Two (2) lots of steel structures for gantry and equipment supports required for completing 420 kV busbar and switchgear as specified in the technical specifications and bid drawings.
- 1B 245 kV Air Insulated Switchgear (AIS)**
- Deleted
- 1C 145 kV Air Insulated Switchgear (AIS)**
- Deleted
- 1D 33 kV Air Insulated Switches and Connection for Auxiliary Transformers**
- Deleted
- 1E Power Transformers & Earthing/Auxiliary Transformers**
- Deleted
- 1F Control, Protection, Monitoring, Substation Automation & Metering**
- 420 kV Circuits**
- The equipment to be supplied, installed and commissioned is shown in bid drawings are comprising of:
- 1F1 Extension of Control, Protection & Monitoring and Substation Automation System including event recording function for four (4) sets of overhead line circuit bays.
- 1F2 Deleted
- 1F3 Extension of two (2) sets of Busbar protection for 400 kV system
- 1F4 Extension of two (2) sets of DFDR
- 1F5 Two (2) lots of Tariff metering panel to accommodate programmable & recordable



digital 3-phase, 4-wire import and export MWh and MVarh meters (accuracy class 0.2) for each 400 kV line and transformer feeder. For each feeder minimum two meters (main & check) including one set software and communication cord. Substation Automation System shall include the metering for all the bays. Tariff Metering is to be supplied from Europe, USA or Japan origin. Printed catalogue, operation and service manual are to be provided.

1G Multicore Cables

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

1H Earthing and Lightning Protection

- 1H1 Two (2) lots of design, supply and installation of earthing system and lightning protection screen including connections, connectors and clamps, to suit the substation overall arrangement and provide supporting design calculations.

1I Batteries, Chargers and DC Distribution

- 1I1 Extension of 110 V substation alkaline batteries and (or) chargers and distribution switchboard to be supplied, installed and commissioned to provide all DC supplies to equipment being supplied.
- 1I2 Extension of 48 V DC system and distribution equipment to be supplied, installed and commissioned in the main control building for the extension of fibre optic multiplexer equipment for communication and protection.

1J LVAC Distribution

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

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

- 1J2 Deleted

- 1J3 Deleted



1K Civil Works, Building and Foundation

- 1K1 Two (2) lots of complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc.
- 1K2 One (1) new one-storied Local Control Building (also known as Switchyard Panel Room – SPR) in Aminbazar 400/230/132 kV AIS Substation.

1L Lighting, Small Power, Air Conditioning and Ventilation

- 1L1 One (1) lot of complete design, supply, installation and commissioning of equipment to provide lighting, LV power supply, air conditioning system, ventilation system and emergency DC lighting for new SPR in Aminbazar 400/230/132 kV AIS Substation.
- 1L2 Two (2) lots of complete set of design, supply, installation and commissioning of equipment to provide lighting (flood light; sodium/mercury) for security, roadway, switchyard and emergency DC lighting at strategic locations for equipment operation and inspection.

1M Fibre Optic Multiplexer Equipment for Communication and Protection

- 1M1 Extension of two (2) lots of design, supply, installation and commissioning of fibre optic multiplexer equipment including necessary works to interface with existing system is to be provided for:

- 87 or 21 relay for each transmission line protection (through fibre cores)
- 21 relay carrier signal (main and back-up)
- SCADA data from switchgear and control system

- 1M2 Deleted

- 1M3 Underground 48 core optical fibre cables from terminal box gantry structure at each 400kV double circuit transmission line termination point to MDF (Main distribution Frame) in control room. The Contract includes supply and installation of pigtail cables with adequate length.

1M4 PLC Equipment:

The equipment to be supplied, installed and commissioned shall be as per the SLD. The scope of supply is summarised as follows:

400 kV

4 sets: Indoor PLC equipment including teleprotection at Gopalganj Substation for (direction Payra 3 & 4 and Aminbazar 3 & 4) 400 kV line.



2 sets: Indoor PLC equipment including teleprotection at Aminbazar Substation for (direction Gopalganj 3 & 4) 400 kV line.

12 nos.: line matching units for phase to phase circuit coupling for 400 kV lines at Gopalganj Substation.

4 nos.: line matching units for phase to phase circuit coupling for 400 kV lines at Aminbazar Substation.

Additionally, if any Interfaces are required for system configuration at each remote end substation, then interface devices shall be installed in each existing system as a lot.

1N SCADA System for Telecontrol and Telemetry

- 1N1 Two (2) lots of complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetry facilities required at the existing National Load Despatch Center (NLDC) at Rampura for integration of extension of 400 bays. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, tap changer, etc. shall be controlled from NLDC through the Gateway of the substation automation system using IEC 60870-5-101 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.

Section-II Mandatory Spares, Erection & 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. Test equipment is to be supplied from Europe, USA or Japan origin. Printed catalogue, operation and service manual are to be provided. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

Section-III Shunt Reactor & Associated works

EMTP Study, Shunt Reactor and associated bay considering Gopalganj 400 kV side requirement of Shunt Reactor and associated shall be determined by EMTP study which shall be carried out under this scope of work.

3A Works and Equipment for Shunt Reactor Installation

The works for shunt reactor shall comply with Volume 2, Section II, Clause 16 and the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and shall comprise the following:

- 3A1 EMTP study (for 400 kV Payra – Gopalganj Line) shall be performed by the Contractor and shall include the following aspects but are not limited to
- i) to determine the requirement and the size of the shunt reactor at both sides of the above transmission lines



- ii) to determine the requirement, rating (kV, kJ, kA etc.) and the number of lighting arrester at Gopalganj 400 kV switchyard
- iii) to determine the value of PIR

The EMTP study shall have to be performed using PSCAD software and shall include training of six (6) Design Engineers of the Employer for two (2) weeks regarding the use of PSCAD software for typical EMTP study including/having example of the said EMTP study under this project.

- 3A2 Two (2) sets of 420 kV, Size: 25 MVAR (only for Bid purpose, the final size shall be as per the EMTP study to be done by the Contractor) (ONAN), three phase outdoor type Shunt Reactor as specified in the technical specifications of this Section. It is to be mentioned that, for change in MVar size of Shunt Reactor during execution based on EMTP study, the price shall be adjusted as follows:

$$P_N = 20\% \times P_0 \pm 80\% \times P_0 \times \frac{\text{New Size}}{\text{Old Size}};$$

Where,

P_N = New price, P_0 = Original price (Corrected Bid price)

- 3A3 Two (2) sets of 420 kV, 2000 A, 63 kA/1sec, 50 Hz, 1425 kVp BIL, live tank type, gang operated, SF6 gas circuit breakers with spring-stored energy operating mechanism capable of reactor switching as specified in the technical specifications, Section II, Clause 3, Volume 2 of 3 of the Bidding Document.
- 3A4 Two (2) sets of 420 kV, 800 A, 50 kA/1sec, 50 Hz, 1425 kVp BIL, horizontal double break, post type, motor operated disconnectors without earthing switch as specified in the technical specifications, Section II, Clause 3, Volume 2 of 3 of the Bidding Document.
- 3A5 Control, Protection, Monitoring & Substation Automation System including event recording function for two (2) sets of Shunt Reactor line circuits as specified in the technical specifications and bid drawings of Volume 2 of 3 of the Bidding Document
- 3A6 One (1) lot of rigid tubular bus [Aluminium of grade 63401 WP], flexible conductors, insulators, fittings including all necessary clamps and connectors required for completing 420 kV busbar and switchgear connection for Shunt Reactor bay as specified in the technical specifications and bid drawings of Volume 2 of 3 of the Bidding Document
- 3A7 One (1) lot of steel structures for gantry, equipment supports and civil works required for completing 420 kV busbar and switchgear for Shunt Reactor bay as specified in the technical specifications and bid drawings of Volume 2 of 3 of the Bidding Document.



APPENDIX A1

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
400kV AIR INSULATED SWITCHGEAR (AIS)**

1. Site Condition

a)	Max. Altitude above sea level	m	not more than 1000
b)	Max. Ambient temperature outdoor	°C	+45
c)	Min. Ambient temperature outdoor	°C	+4
d)	Max. Ambient relative humidity	%	100
e)	Max. Seismic acceleration at floor level		
	- horizontal	g	0.1
	- vertical	g	0.1

2. Electrical Data

a)	Rated Voltage	kV	420
b)	Rated Frequency	Hz	50
c)	Insulation Level		
	- lightning impulse withstand	kVp	1550 for Bus PI 1425 for other equipment
	- switching impulse withstand	kVp	1175(Ph-E) for Bus PI 1050(Ph-E) for other equipment
	- 50 Hz withstand 1 minute	kV	—
d)	Rated continuous current at 40°C ambient temperature		
	- Main Busbar	A	4000
	- Diameter	A	4000
	- Transformer Bay	A	1600
	- Line Bay	A	4000
	- Coupler Bay	A	4000
e)	Rated short time withstand		
	- current	kA	63
	- duration	Sec	1
	Rated peak withstand current	kA	125

3. Secondary Circuit

a)	Auxiliary voltage		
	- for control and signal	V dc	110
	- for remote control	V dc	110
	- for heating	V ac	415/240
	- tolerances	%	-15/+10



4. 420kV Class Circuit Breakers

1	Type	Outdoor, SF ₆ insulated, live tank type
2	Standard	IEC 62271-100
3	Rated voltage	420 kV
4	Rated short-duration power frequency withstand voltage (1 min.) - Between line terminal and ground - Between terminals with CB open	520 kV rms 610 kV rms
5	Rated switching impulse withstand voltage - Between line terminal and ground - Between terminals with CB open	1050 kV peak 900 (+345) kV peak
6	Rated lightning impulse withstand voltage - Between line terminal and ground - Between terminals with CB open	1425 kV peak 1425 (+240) kV peak
7	First pole to clear factor	1.3
8	Rated current	4000 A
9	Rated short circuit breaking current	63 kA rms
10	Rated short circuit making current	125 kA peak
11	Short time withstand current for 1 sec.	63 kA rms
12	Corona extinction voltage with CB open or close	320 kV rms
13	Max. radio interference voltage for frequency between 0.5MHz and 2MHz in all positions	1000 micro V (at 266 kV rms)
14	Total closing time	Not more than 150 ms
15	Total breaking time	40 ms
16	Operating mechanism	Spring
17	Rated duty cycle	O-0.3s-CO-3min-CO
18	Reclosing	Single phase & Three phase auto-reclosing
19	Creepage distance	25 mm/kV
20	Number of closing coils	1
21	Number of tripping coils	2
22	Number of auxiliary contacts for: - Making - Breaking - Middle position	Min. 12 Min. 12 0
23	Ingression Protection class	IP55

5. 420kV Class Isolators and Earthing Switch

1	Type	Outdoor, Horizontal double break
2	Standard	IEC 62271-102
3	Rated voltage	420 kV
4	Rated short-duration power frequency withstand voltage (1 min.) - To earth - Across isolating distance	520 kV rms 610 kV rms
5	Rated switching impulse withstand voltage - To earth - Across isolating distance	1050 kV peak 900 (+345) kV peak
6	Rated lightning impulse withstand voltage - To earth - Across isolating distance	1425 kV peak 1425 (+240) kV peak
7	Corona extinction voltage	320 kV rms
8	Rated normal current	4000 A
9	Rated short circuit current (I _{th}), 1s	63 kA rms
10	Rated short circuit current (I _{dyn})	125 kA peak
11	Creepage distance of insulator	25 mm/kV
12	Operating mechanism of isolator / earthing switch	AC motor operated
13	Number of auxiliary contacts for main switch - Making - Breaking - Middle position	Min. 12 Min. 12 Min. 1
14	Number of auxiliary contacts for earthing switch - Making - Breaking - Middle position	Min. 12 Min. 12 Min. 1
15	Radio interference level for 0.5 MHz to 2 MHz	1000 micro V (at 266 kV rms)

6. Instrument Transformers

1	Rated lightning impulse withstand voltage	1425 kVp
2	Rated switching impulse withstand voltage	1050 kVp



3	Power frequency withstand voltage (1 min)	630 kVrms
4	Corona extinction voltage	320 kVrms
5	Radio interference level for 0.5 MHz to 2 MHz	1000 micro V (at 266 kVrms)
6	Partial discharge level	10 pC
7	Type of insulation	Class A

7. 420kV Class Current Transformers

1	Core No.	6
2	Ratio	4000/1
3	Class of accuracy	- Busbar Protection: Class X - Protection: 5P20 - Metering: Class 0.2
4	Burden (VA)	- Protection: 60 - Metering: 10
5	Min. knee point voltage at lowest ratio (Volts)	600 and over (to be finalized after sizing calculation during execution of the project)
6	Max. magnetizing current guaranteed at knee point voltage & the lowest ratio (mA)	M.R
7	Max. resistance of secondary winding at 75 °C and at lowest ratio (ohms)	M.R

8. 420kV Class Capacitive Voltage Transformer

1.	Rated voltage levels	420 kV
2.	High frequency capacitance for entire carrier frequency range	Within 80% to 150% of rated capacitance
3.	Rated Voltage Factor	1.2 continuous; 1.5 for 30 seconds
4.	Rated total capacitance(pF)	5000, +10% and -5%
5.	Phase angle error (minutes)	20
6.	Acceptable limit of variation of total capacitance over the entire carrier frequency range	+ 50% and -20% of the rated capacitance
7.	Equivalent series resistance over the entire carrier frequency range or temperature range (ohms)	Less than 40



8.	Stray capacitance and stray conductance of low voltage terminal over the entire capacitance.	As per IEC-358		
9.	Standard reference range of frequencies for which the accuracies are valid	97% to 103% for protection 99% to 101% for metering		
10.	Primary winding Resistance			
11.	Magnetizing Current			
12.	Total Loss			
13.	Core details	Core-I:	Core-II:	Core-III:
14.	Purpose	Protection	Protection	Metering
15.	Secondary Voltage	110/√3	110/√3	110/√3
16.	Burden (VA)	10	10	10
17.	Class of accuracy	3P	3P	0.2
18.	Rated total thermal burden (VA)	200	200	200
19.	One-minute power frequency withstand voltage between LV terminal and earth (kV rms)	4(10 if the low voltage terminal is exposed)		
20.	Withstand voltage for secondary winding (kV rms)	2		
NOTE: The accuracy of 0.2 on winding III shall be maintained up to Rated total Thermal burden (200VA).				

9. Surge Arresters

1	Max. highest system voltage	420kV	145kV	36kV
2	Type	Outdoor type, ZnO, Gapless		
3	Standard	IEC 60099-4		
4	Rated voltage	390kV	120kV	30kV
5	Max. continuous operating voltage	303kVrms	102kVrms	25kV
6	Nominal discharge current	10kA	10kA	10kA
7	Discharge class	Heavy duty 3	Heavy duty 3	Heavy duty 3
8	Surge counter	Yes	Yes	Yes
9	Leakage current detector	Yes	Yes	Yes



APPENDIX A2

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
400/132/33 kV POWER TRANSFORMER**

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APPENDIX A3

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
400/230/33 kV POWER TRANSFORMER**

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APPENDIX A4

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
33/0.415 kV EARTHING/AUXILIARY (STATION SERVICE) TRANSFORMER**

Deleted

APPENDIX A5

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
33kV XLPE POWER CABLES**

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APPENDIX A6

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
NI-CAD BATTERY**

Deleted



APPENDIX A7

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
110 V BATTERY CHARGER**

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APPENDIX A8

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
48 V BATTERY CHARGERS**

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APPENDIX A9

SCHEDULE OF TECHNICAL REQUIREMENTS OF
SUBSTATION AUTOMATION SYSTEM

1. General Requirement:		
	Standards to be complied with Substation Automation system	
	Test Ca. Damp heat steady state	IEC 60068-2-3
	Test Db and guidance; Damp heat cyclic	IEC 60068-2-30
	Digital I/O, Analogue I/O dielectric Tests	IEC 60870-3 Class 2
	Digital I/O, Surge withstand test	IEC 60801-5 Class 2
	Radio interference test	IEC 60870-3 Class 2
	Transient fast burst test	IEC 60801-4/4
	Static Discharge	IEC 60801-2/4
	Electromagnetic fields	IEC 60801-3-3
	Temperature range (min/max)	°C 0/50
	Relative humidity	% 93
	Intelligent Electronic Devices (IED's)	
	- serial communication interface included?	Yes
	- Protection & Control IED's connected same bus?	Yes
	- self monitoring	Yes
	- display of measured values	Yes
	- remote parameterization	Yes
	- disturbance record upload and analysis	Yes
	Availability Calculation shall be furnished for each equipment as well as for the entire system	Yes
	The main part of the system, HMI, Gateway, IED shall be furnished with dual communication port against any failure.	Yes
	SNTP server shall provide GPS time-sync information to all communication (HMI, Gateway, IED) and the system shall be synchronized.	Yes
	Ethernet switch shall have dual system topology not to lose entire system with single switching system failure.	Yes
2. Detailed Requirements:		
	Number of years of proven field experience of offered system. (Note: proof of experience should be furnished. The components used in the offered system and those with field experience should be the same) Design life of substation Automation System Manufacturers quality assurance system Dimensions of cubicle - Width	5 Yrs. 20 Yrs ISO 9001/9002 or equivalent



	<ul style="list-style-type: none"> - Depth - Height - Floor load 	mm mm mm N/m2 max.600
3. Station Level Equipment:		
	Station Controller MTBF (Mean time between Failures) MTTR (Mean time to repair)	Industrial PC Hrs Hrs
	Station computer shall have dual connection to Ethernet switch as redundant (hot, standby) Hot standby take over time Dual Wide Monitor each HMI (over 25") Single wide screen Annunciator for Station PC system software Number of years of proven field experience of offered software	Yes Seconds Yes Yes 16 Windows 5 Yrs
	Operating System All standard picture as per spec included in HMI Process Status Display & Command Procedures Event processing as per spec Alarm processing as per spec Reports as per spec Trend Display as per spec Graphical fault information receiving function Disturbance & Fault recording and analysis with graphical format User Authority levels as per spec System supervision & monitoring as per spec Automatic sequence control as per spec	Windows Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
4. Gateway to National Load dispatch Center		
	Number of years of proven filed experience of offered unit Insulation tests Fast disturbance tests Industrial environment Industrial grade hardware with no moving parts (PC based gateway is not accepted) Design life of offered equipment Redundant communication channel Redundant CPU Redundant DC/DC Supply MTBF (Mean time between Failures) MTTR (Mean time to repair)	5Yrs IEC 60255-5 IEC 61000-4-4 Class 4 EN 50081-2 Class A Yes 20 Yrs Yes Yes Yes Hrs Hrs



	Gateway shall have dual connection to ethernet switch (hot and standby)	Yes
5. Station Bus:		
	Physical Medium Each communication devices shall have dual connection, hot and standby.	Glass fibre optic Yes
6. Interbay Bus		
	Physical Medium	Glass fibre optic
7. Printer server		
	MTBF	Hrs
8. Event Printer		
	MTBF	Hrs
9. Hard Copy colour Printer		
	MTBF	Hrs
10. Master Clock – GPS (Global Positioning System) Receiver:		
	MTBF	Hrs
11. Bay control Unit - HV		
	Number of years of proven field experience of offered unit	5 Yrs
	Separate Bay controller unit provided for each bay & feeder	Yes
	Type of bay controller offered HV/MV	HV
	Select Before Operate with Open Execute & Close Execute	Yes
	Single bit dependence	No
	Interlocking, bay & Station wide	Yes
	Synchro-check function	
	- Maximum Voltage difference	Specify range
	- Maximum Frequency difference	Specify range
	- Maximum Phase difference	Specify range
	Double command blocking	Yes
	Independent settable parameter groups	4
	Local Display Unit	Yes
	Sequence of event recorder	
	- Events	256
	- Time resolution	1 ms
	Disturbance recording file transfer function	Yes
	Comtrade file generation function of Disturbance Recorder	Yes
	IED shall have dual connection to Ethernet switch (hot & standby)	Yes
	Comprehensive self-supervision	Yes
	Battery free backup of events and disturbance records	Yes
	Insulation tests	IEC 60255-5
	Fast disturbance tests	IEC 61000-4-4, Class 4



	MTBF	Hrs
	MTTR	Hrs
	Temperature range: IED's	
	- Operation	°C -10 to +50
	- Transport and storage	°C -10 to +50
	Relative humidity:	
	- Operating max./min	% 93
	- Transport and storage	% 93
12. Back up control mimic –HV (400kV)		
	Control functionality:	
	Control of breaker as well as all isolators/earthing switch (Control functionality should not be affected if bay controller fails)	Yes
	Key-Locked	Yes
	Interlock override function	Yes
	Separate backup control mimic provided for each bay & feeder	Yes
13. System Performance:		
	Exchange of display (First reaction)	< 1 s
	Presentation of a binary change in the process display	< 0.5 s
	Presentation of an analogue change in the process display	< 1 s
	From order to process output	< 0.5 s
	From order to updated of display	< 1.5 s



APPENDIX A10

SCHEDULE OF TECHNICAL REQUIREMENTS OF
FIBRE OPTIC MULTIPLEXER EQUIPMENT

SL. No.	DESCRIPTION	UNIT	REQUIRED
1.0	GENERAL:		
1.1	Type of multiplexer		SDH: ADM
1.2	Complying to ITU-T rec.		Yes
1.3	Transmission Capacity	Mbit/s	STM-4 & STM-16
1.4	Access capacity on 64 kbit/s	channels	Minimum 200
1.5	Access capacity on 2 Mbit/s	channels	Minimum 40
1.6	Redundant central processor		Shall be available
1.7	Digital cross connect function		Fully non-blocking
2.0	Available AGGREGATES:		
2.1	Optical aggregates (ITU-T G.957)		L-1.1, L-1.2
3.0	AVAILABLE TRUNK INTERFACES:		
3.1	HDB3, 2 Mbit/s interfaces per module	No.	Minimum 8
3.2	Complying to ITU-T rec.		G.703, transparent G.704, selectable
3.3	HDSL, 2Mbit/s interface: no of copper wires Capacity on 2Mbit/s or on 1Mbit/s Capacity selectable	No. ch ch / pair of wire	4 or 2 30 or 15 30 / 2 pairs 30 / 1 pair 15 / 1 pair
4.0	AVAILABLE USER INTERFACES		
4.1	Voice interfaces for trunk lines:		
4.1.1	1 + 1 com path protection, available for all		yes
4.1.2	Analogue, 4wire with E&M: Input level Output level	dBr	+7.5 .. -16 +7.0 .. -16.5
4.1.3	Analogue, 2wire with E&M: Input level Output level	dBr	+6.5 .. -12.5 -1.0 .. -20
4.1.4	Digital, 2Mbit/s CAS or PRI		yes
4.2	Voice interfaces for remote subscriber:		
4.2.1	2wire, subscriber side	dBr	-5 .. +4 / -7.5 .. -1
4.2.2	2wire, PABX side	dBr	-5 .. +4 / -7.5 .. -3
4.3	Integrated teleprotection		
4.3.1	Interface for Commands:		
4.3.1.1	Number of independent commands	No.	4
4.3.1.2	Transmission time max.	ms	6
4.3.1.3	Signal voltage	Vpeak	250
4.3.1.4	1 + 1 com path protection		yes
4.3.2	Interface(s) for Differential Protection:		
4.3.2.1	Electrical interface: G.703	kbit/s	64



SL. No.	DESCRIPTION	UNIT	REQUIRED
4.3.2.2	Optical Interface	kbit/s	Minimum 64
4.4	Data: channels per module		
4.4.1	1 + 1 com path protection, available for all		yes
4.4.2	V.24/V.28 (RS-232): up to 38.4kbit/s	No.	4
4.4.3	V.11/X.24 (RS-422): 64kbit/s	No.	4
4.4.4	V.35: 64kbit/s	No.	4
4.4.5	V.36 (RS-449): 64kbit/s	No.	2
4.4.6	G.703: 64kbit/s	No.	8
4.4.7	Ethernet: 10/100 BaseT WAN capacity Protocols	No. Mbit/s	1 Min: 2x 2Mbit/s Min.: IP
4.5	Integrated alarm gathering module:		
4.5.1	Number of external alarms per module	No.	Min. 20
4.5.2	Auxiliary power supply for ext. contacts		Yes
4.6	Network Management System		
4.6.1	Type/Name of configuration tool		
4.6.2	For fault / configuration management		Yes / yes
4.6.3	For local / remote operation		Yes / yes
4.6.4	Data communication network (DCN)		Ethernet / IP or Ethernet / OSI
4.7	Ambient Conditions:		
4.7.1	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	-25 .. + 55 / class 1.2
4.7.2	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	-25 .. + 70 / class 2.2
4.7.3	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	-5 .. +45 / class 3.1E
4.8	Power Supply		
4.8.1	Operation	VDC	48 / 60 (-15/+20%)
4.8.2	Fully redundant power supply		yes



APPENDIX A11

**SCHEDULE OF TECHNICAL REQUIREMENTS OF
OPERATIONAL TELEPHONE SYSTEM (PABX)**

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APPENDIX A 12**SCHEDULE OF TECHNICAL REQUIREMENTS OF
POST INSULATOR**

1	Rated Voltage	420kV
2	Lightning impulse withstand positive and negative (kVp) (Dry and wet)	1425
3	Switching impulse withstand voltage (kVp)	1050
4	One min. power freq. withstand voltage (kVrms) (Wet and Dry)	650
5	Total creepage distance (mm) pedestal	10500
6	Total min. cantilever strength (kg) [To be confirmed by the Contractor with Calculation during execution of the project]	1000
7	Corona extinction voltage (kVrms)	320
8	Total min. height of insulator (mm)	3500



APPENDIX A13**SCHEDULE OF TECHNICAL REQUIREMENTS OF
STRING INSULATOR**

1	Rated voltage	420kV
2	Type	Anti-FOG
3	Size of insulators units (mm)	255 x 145
4	Creepage distance of individual insulator unit (Minimum or as required to obtain total creepage distance, mm)	430
5	Electromechanical strength (kN)	120
6	Power frequency withstand voltage of the complete string (kVrms)	650
7	Lightning impulse withstand voltage of the complete string with C.C. ring (Dry and wet, kVp)	1425
8	Switching surge withstand voltage of the complete string with C.C. rings (Dry & wet, kVp)	1050
9	Power frequency puncture withstand voltage for a string insulator unit	1.3 times the actual wet flashover voltage of the unit.
10	Minimum corona extinction voltage level of the complete string with C.C. ring (Dry, kVrms)	320
11	R.I.V. Level of the complete string with C.C. ring. (micro V)	1000
12	Total creepage distance of complete insulator string (mm)	10500



APPENDIX A14

SCHEDULE OF TECHNICAL REQUIREMENTS
DIGITAL FAULT AND DISTURBANCE RECORDER [DFDR]

SL. NO.	ITEM	UNITS	REQUIRED
(A)	GENERAL		
1	Manufacturer's name & address		
2	Type		
3	Power Supply	VDC	110
	-Power supply for printer	VAC	230
(B)	ANALOGUE INPUTS		
1	Number of Channel		128 for 400kV and 120 for 132kV
	-Expandability		Min. 136
2	Nominal Current	Amp	1A/5A
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for chosen sampling rate	Yes/No	Yes
d	Simultaneously programmable sampling rate for all feeders/inputs		Min 2 for FAST and SLOW Recording
	-Locally Changeable	Yes/No	Yes
	-Remotely Changeable	Yes/No	Yes
e	Possible sampling rates		3 different sampling rates:
		Samples/sec	Slow. 1 Hz-500 Hz
		Samples/sec	fast: 0.5 kHz – 6 kHz
		Samples/sec	continuous (variable rate)
6	DC coupled inputs	Yes/No	Yes
7	Resolution	bits	12 or better
8	Accuracy	%	Min 0.5
9	Burden		
	1. Current Circuit at IN	VA	
	2. Voltage Circuit	VA	
10	Overload		
	1. Current	% In	100% In continuously, Min 600 %



SL. NO.	ITEM	UNITS	REQUIRED
	2. Voltage circuit	% Vn	in for 1 Second 2Vn and max. 350 Vn
(C)	DIGITAL INPUTS		
1	Number of Channel		384 for 400kV and 360 for 132kV min. 360
	-Expandability (Without and time skew)		
2	Selectable input level	Vdc	N/O or N/C, 110 VDC
3	Type		Potential or potential free contact
4	Resolution	ms	
(D)	MEMORY		
1	Size	MB	64 MB or Higher
2	Type		Solid State
3	Pre-fault time (fast scanning rate)	sec	0.1-2 user programmable
4	Post-fault (fast scanning rate)	sec	0.1-2 user programmable
5	Pre and Post-fault time (slow scanning rate)	sec	min. 180 user programmable
6	In-Built hard disk (auto-maintained)	GB	min. 4 GB
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/triggers are preferable Programmable and Virtually recordable	Yes/No	Yes
1.	Logical combination sensor	Yes/No	Yes
2.	Three phase over or under Voltage / Current	Yes/No	Yes
3.	Mono phase over or under Voltage / Current	Yes/No	Yes
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases], df/dt. etc.	Yes/No	Yes
5.	RMS [Voltage / Current]	Yes/No	Yes
6.	Zero Sequence	Yes/No	Yes
7.	Negative, Positive Sequence	Yes/No	Yes
8.	Frequency	Yes/No	Yes
9.	DC Step	Yes/No	Yes
10.	Pending / Swing	Yes/No	Yes
11.	Digital level and edge	Yes/No	Yes
12.	Sensor trigger	Yes/No	Yes
13.	Event Trigger	Yes/No	Yes
14.	Manual Trigger	Yes/No	Yes



SL. NO.	ITEM	UNITS	REQUIRED
15.	Remote Trigger	Yes/No	Yes
(F)	CLOCK SYSTEM		
1.	Internal Clock	Yes/No	Yes
2.	Accuracy		
3.	External Synchronization	Yes/No	Yes
4.	Time resolution between 2 synchronized pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	250 Vac or above, 60 Vdc or above
2.	Make and carry for 0.5 sec	A	Min 8A
3.	Carry Continuously	A	Min 5A
4.	Break (DC) – resistive	W	
(H)	INTERFACE FOR DATA COMMUNICATION		
1.	Full definition compression	Yes/No	Yes
2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	Yes
4.	Printer Port	Yes/No	Yes
5.	Dedicated serial port for modem	Yes/No	Yes
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scale (mm/s)		
3.	Printer resolution	mm	
4.	Auto printing	Yes/No	Yes
(J)	Fault Priority transmission	Yes/No	Yes
(K)	Fault location (distance calculation)	Yes/No	Yes
(L)	Test certificates from internationally recognized Laboratories	Yes/No	Yes
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		



SL. NO.	ITEM	UNITS	REQUIRED
	1. Processor Pentium	(MHz) Yes/No	Yes, at least 450 MHz Pentium
	2. Co-Processor Pentium	Yes/No	Yes
	3. Main memory capacity	(Mb) Yes/No	Yes, at least 64 MB
	4. Color graphics board S-VGA	Yes/No	Yes
	5. Screen S-VGA	Yes/No	Yes
	6. Hard disk unit	Yes/No	Yes, at least 40 GB
	7. Printer	Yes/No	Yes
	8. Modem	Yes/No	Yes.

***Note:** du/dt=Change of voltage, dp/dt=Change of active power, dq/dt=change of reactive power, df/dt=Change of frequency.



APPENDIX A15

SCHEDULE OF TECHNICAL REQUIREMENTS of
WAVE TRAP

15.1 400 kV WAVE TRAP

SI No	Item	Specification
1.	Type of Line Trap Installation	To be inserted into high voltage A.C transmission line phase in series
2.	Type of mounting	Pedestal
3.	Suitable for system Frequency	50Hz
4.	Nominal System Voltage	400 KV
5.	Highest System Voltage	420 KV
6.	Rated Continuous Current	4000 A
7.	Rated Short time current for 1 second	50kA
8.	Asymmetrical peak value of the First half wave of the rates short Time current	127.5 KA
9.	Rated inductance	1.0 mH
10.	Type of Tuning	Band tuned line trap
11.	Blocking Band frequency range	Band-I 56 to 124 KHZ Band-II 76 to 500 KHZ
12.	Minimum Guaranteed resistive Component of impedance in Blocking Frequency Rang	500 Ohm
13.	Protective device	a) Non-linear resistive type Gapped lightning arresters for A.C system. b) Polymer housed Metal oxide surge arrester without Gaps for A.C system.
14.	Nominal discharge current of protective device	10 KA. However, Co-ordination shall be done by taking 20KA 8/20 micro-sec discharge into consideration.
15.	Rated voltage of protective device	>15.72 KV rms
16.	Minimum value of power frequency spark over voltage (Dry & wet) of protective device	>23.58KV rms
17.	Visual Corona Extinction Volt	320 KV rms
18.	Radio influence Voltage (RIV)	<500 micro Volt@280 KV
19.	Attention in tuned frequency band	<7.5 dB
20.	Maximum tapping loss over blocking Band I & II stated above	2.6 dB
21.	Insulation class	Class F Insulation
22.	Maximum working stress	Twice the weight of wave trap+500Kgs.



APPENDIX A16

SCHEDULE OF TECHNICAL REQUIREMENTS of
SHUNT REACTOR

16.1 400 kV SHUNT REACTOR

SL NO.	Description	Unit	Required data
1.	Name of manufacturer		
2.	Model		
3.	Service conditions:		
	- External cooling medium	-	Air
	- Altitude not exceeding	M	150
	- Air temperature not exceeding	°C	45
	Average air temperature in any one year not exceeding:		
	- In any one day	°C	35
	- Average in one year	°C	25
4.	Rated voltage	kV	420
5.	Rated lightning impulse withstand voltage		
	- HV	kV	1425
	- Neutral		(To be filled)
6.	Rated switching impulse withstand voltage		
	- HV	kV	1050
	- Neutral		NA
7.	Rated power Frequency withstand voltage	kV	
	- HV		650
	- Neutral		(To be filled)
8.	Vector Group		Grounded Wye
9.	Method of Earthing		Solidly Earthed
10.	Maximum temperature Rise		
	- windings	°C	
	- Top oil		
	- Hot spot of Core		
11.	Total Losses at rated voltage & frequency		
	- Core Loss	kW	(To be filled)
	- Copper Loss		
	- Total		
12.	Cooling		ONAN
13.	Rated Power at Rated voltage & frequency	MVar	25 (For Bidding purpose only)
14.	Rated Current	A	(To be filled)
15.	Rated reactance/phase		(To be filled)
16.	Zero sequence reactance		(To be filled)
17.	Mutual Reactance		(To be filled)



SL NO.	Description	Unit	Required data
18.	Linearity Range of magnetic circuit percent to rated voltage	%	(To be filled)
19.	Reactance during saturation percent to rated reactance	%	(To be filled)
20.	Harmonics	%	(To be filled)
	- Even		
	- Total		
21.	Core Design	Gapped/Air Core	(To be filled)
22.	No. of Core	No's	(To be filled)
23.	Material & type of Core		(To be filled)
24.	Type of winding		(To be filled)
25.	Winding Connection brazed or crimped		(To be filled)
26.	Type of Insulation	Non/Uniform	
	- HV side		(To be filled)
	- Neutral side		
27.	Flux Density at Rated voltage & frequency		
	- Core	T	(To be filled)
	- Yokes		
28.	Volts per turn	V/t	(To be filled)
29.	Efficiency	%	(To be filled)
30.	Regulation		
	- At unity power factor	%	(To be filled)
	- At 0.8 lagging power factor		
31.	Bushing Current Transformer		
	-Ratio	--	
	-Class	--	5P20
	-Burden	VA	30 (Actual value shall be as per calculation during execution)
32.	Maximum Sound Pressure level	dB	78
33.	Oil Type		(To be filled)
34.	Weight of Active part	kg	(To be filled)
35.	Weight of Oil*	kg	(To be filled)
36.	Total weight*	kg	(To be filled)
37.	Heaviest part for shipment	kg	(To be filled)

*These values are required for Foundation design & shipping purpose only. During detail design, these values may vary from Bid value due to attaining desired electrical output.



SCHEDULE B: SCHEDULE OF RATES AND PRICES

Price Schedules are given hereafter. Bidders are requested to carefully go through the relevant ITB Clauses in Volume 1 to fill in the Price Schedules.

The Bidder shall fill the price schedules, sign and stamp them and attach them to the bid.



SCHEDULE C: BAR CHART PROGRAM OF KEY ACTIVITIES - DELIVERY & COMPLETION TIME SCHEDULE

The times given under Column D are the commissioning target dates at present planned to be achieved and may be the subject of mutual adjustment.

Column A details the earliest dates by which access to site can be given for storage purposes. The times entered under column B are to be the dates guaranteed for arrival at Site of the first shipment of parts for the circuits in question being also the dates when the contract requires access to the Site for plant erection, to the extent necessary to enable him to proceed with work to meet the dates under column C guaranteed for complete delivery, erection and commissioning of the shipment.

The times include all necessary control, relay, metering, auxiliary power ancillary equipment to enable the respective circuit or item of plant to be completely commissioned and put into commercial operation, together with such other associated equipment, e.g. busbars, etc as will ensure that subsequent shutdown are unnecessary or at least only of a temporary or short time nature.

The dates assume an order is placed by
(to be advised or stated by Bidder)

Site	A* Latest Access Permitted	B* Guaranteed Arrival of First Shipment	C* Guaranteed Completion	D* Target Completion
Payra-Gopalganj Transmission Line Portion	7 days from the date of signing of the Contract			
Gopalganj-Aminbazar Transmission Line Portion	7 days from the date of signing of the Contract			
Padma River Crossing Transmission Line Portion	7 days from the date of signing of the Contract			
Gopalganj Sub-Station	7 days from the date of signing of the Contract			
Aminbazar Sub-Station	7 days from the date of signing of the Contract			

* Time in days, after contract effective date.



SCHEDULE D: MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING

The following form shall be filled and attached to the bid. Bidders are free to propose more than one Manufacturer for each item.

Item	Description	Manufacturer	Place of Manufacture	Place of Testing and Inspection
1.	Towers			
	Tower			
	Nuts, bolts, washers etc.			
2.	Conductor & Fittings			
	Conductor			
	Conductor fittings			
3.	Earthwire & Fittings			
	Earthwire			
	Earthwire fittings			
4.	OPGW & Fittings			
	OPGW			
	OPGW fittings			
	Joint/Splice Boxes			
5.	Insulator & Fittings			
	Insulator units			
	Insulator fittings			
6.	420kV AIS Switchgear			
	Steel Structure			
	Circuit Breaker			
	Disconnecter			
	• Main Part			
	• PI			
	Instrument Transformer			
	• CT			
	• CVT			
	Surge Arrestor			
	Wave Trap			
7.	Shunt Reactor			
	Complete			
	HV Bushings			
	NV Bushings			
	Porcelain for Insulators			
	Copper			
	Core Plates			
	Tanks			
	Radiators			
	Temperature Indicators			
	Oil Valves			



Item	Description	Manufacturer	Place of Manufacture	Place of Testing and Inspection
	Pressure Relief Device			
	Gas / Oil Actuated Relay			
	Reactor Oil			
	Remote Control Panel			
	Indicating Instruments			
8.	Protection, Metering and Control			
	Panels			
	Instruments			
	Protective Relays			
	Substation Automation System			
	Meters			
	Transducers			
	DFDR			
9.	Flexible Conductor, Rigid Tubular Bus (420kV)			
	Rigid Tubular Bus			
	Flexible Conductor			
	Insulator			
	Fittings and Clamps			
10.	DC Equipment			
	Distribution Boards			
11.	Multicore Cables			
	PVC Insulated Cables			
	Cable Trays			
12.	Earthing			
	Copper Tape			
	Insulated Copper Conductor			
13.	Power Line Carrier			
	PLC Terminal Unit			
	Line Traps			
	Line Matching Unit			
	Co-Axial Cable			
	Tele-Protection Equipment			



SCHEDULE E: TECHNICAL PARTICULARS AND GUARANTEES

1 TOWERS

1.1 400KV TOWERS

Parameters	Unit	Tower Type								
		4DL	4D1	4D25	4DX P	4D45	4DT 6	4DAX	4DR 1	4DR 2
Total height of tower (standard)	(mm)									
Vertical spacing between conductor-earthwire	(mm)	8000	8000	8000	8000	8000	8000	8000	8000	8000
Horizontal phase separation	(mm)									
Vertical phase separation	(mm)									
Total approx. mass of standard height tower without stub & cleat*	(kg)									
Total approx. mass of E1.5 tower*	(kg)									
Total approx. mass of E3.0 tower*	(kg)									
Total approx. mass of E4.5 tower*	(kg)									
Total approx. mass of E6.0 tower*	(kg)									
Total approx. mass of E9.0 tower*	(kg)									
Total approx. mass of E12.0 tower*	(kg)									
Total approx. mass of E15.0 Tower*	(kg)									
Total approx. mass of E20.0 Tower*	(kg)									
Total approx. mass of E25.0 Tower*	(kg)									
Total approx. mass of E30.0 Tower*	(kg)									
Total approx. mass of E40.0 Tower*	(kg)									
Total approx. mass of stub & cleat*	(kg)									
Approximate ultimate compression load/leg (highest extension)*	(kN)									
Approximate ultimate uplift load/leg (highest extension)*	(kN)									

* The final figures will be obtained during detailed design of towers and the approval thereof after award of contract, and the towers shall be supplied accordingly within the contract price.

	Mild Steel			High Yield Steel		
	Standard	Grade	Yield Stress	Standard	Grade	Yield Stress
Steel standard and grades		S275JR	275kN		S355JO	355kN
Bolt standard and grades	ISO 898	5.6				
	ISO 898	8.8				



2 PILED FOUNDATION DETAILS

2.1 400KV TOWERS

Tower Type Particulars	4DL (Highest extension)	4D1 (Highest extension)	4D25 (Highest extension)	4D45 (Highest extension)	4DT6 (Highest extension)	4DR1 (Highest extension)	4DR2 (Highest extension)	4DA X
Type of piled foundation								
Number of piles per leg*								
Length of pile* (mm)								
Diameter of pile* (mm)								

- * The final figures will be obtained during detailed design of tower foundations and the approval thereof after award of contract, and the foundations shall be supplied accordingly within the contract price.



3 CONDUCTOR & EARTHWIRE

3.1 400KV LINE – OVERLAND PORTION

Conductor	Phase		Earthwire	
	As per Bid requirement	As per Bid Proposal	As per Bid requirement	As per Bid Proposal
Designation (Code Name)				
Type				
Reference standards				
Aluminium/ Aluminium alloy grade				
Steel grade				
Galvanising Thickness				
Aluminium class (AS wire)				
Aluminium type (AS wire)				
Conductor max. continuous operating temperature (°C)				
Minimum mass of grease (kg/km)				
Creep period of conductor to be considered (years)				
No. and diameter of aluminium wire (No./mm)				
No. and diameter of steel wire (No./mm)				
Overall diameter of conductor (mm)				
Overall sectional area of conductor (mm ²)				
Rated tensile strength of conductor (kN)				
Weight (kg/km)				
Direction of external lay				
Cross Sectional Area of Al (mm ²)				
Cross Sectional Area of Composite Core (mm ²)				
No. of Composite Core (mm)				
Shape of wires				
Diameter of Composite Core (mm)				
Rated tensile strength of core (kN)				
Current carrying capacity at 180 Deg C (amp)				
Max. allowable emergency operating temp. (Deg C)				
Maximum DC Resistance at 20 Deg C (ohm/km)				



3.2 400KV LINE – RIVER CROSSING PORTION

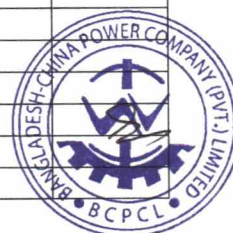
Conductor	Phase		Earthwire	
	As per Bid requirement	As per Bid Proposal	As per Bid requirement	As per Bid Proposal
Designation (Code Name)				
Type				
Reference standards				
Aluminium/ Aluminium alloy grade				
Steel grade				
Galvanising Thickness				
Aluminium class (AS wire)				
Aluminium type (AS wire)				
Conductor max. continuous operating temperature (°C)				
Minimum mass of grease (kg/km)				
Creep period of conductor to be considered (years)				
No. and diameter of aluminium wire (No./mm)				
No. and diameter of steel wire (No./mm)				
Overall diameter of conductor (mm)				
Overall sectional area of conductor (mm ²)				
Rated tensile strength of conductor (kN)				
Weight (kg/km)				
Direction of external lay				
Cross Sectional Area of Al (mm ²)				
Cross Sectional Area of Composite Core (mm ²)				
No. of Composite Core (mm)				
Shape of wires				
Diameter of Composite Core (mm)				
Rated tensile strength of core (kN)				
Current carrying capacity at 180 Deg C (amp)				
Max. allowable emergency operating temp. (Deg C)				
Maximum DC Resistance at 20 Deg C (ohm/km)				



4 OPGW & FITTINGS

4.1 400KV LINE

Parameter	Unit	Overland Portion		River Crossing Portion	
		As per Bid requirement	As per Bid Proposal	As per Bid requirement	As per Bid Proposal
OPGW designation & type					
Number of fibres					
Reference standard					
Number and diameter of aluminium strands	mm				
Number and diameter of steel strands	mm				
Corrosion protection of steel strands					
Internal fibre tube diameter	mm				
Overall diameter	mm				
Guaranteed ultimate tensile strength	kN				
Final modulus of elasticity	N/mm ²				
Coefficient of linear expansion	1/degree				
DC resistance at 20°C	ohms/m				
Maximum short circuit current capacity	kA ² sec				
Assumed temperature rise	°C				
Standard weight	kg/m				
Weight of grease	kg/m				
Standard length on drum*	m				
Weight of complete drum	kg				
Maximum drum length	m				
Installation minimum bending radius	m				
Optical Characteristics:					
Cut-off wavelength	nm				
Attenuation at Nm	dB/km				
Zero dispersion wavelength	nm				
Chromatic dispersion at nm	ps/km				
Individual splice loss	dB				
Bit error rate					
OPGW Fittings:					
Guaranteed ultimate tensile strength					
• Suspension set	kN				
• Tension set	kN				
Overall length of set					
• Suspension set	mm				
• Tension set	mm				
Mass of set					
• Suspension set	kg				
• Tension set	kg				
Drawing numbers					
Cross section of OPGW					
Cross section of non-metallic cable					
Joint box					
Fixing clamps					
OPGW suspension set					
OPGW tension set					



Parameter	Unit	Overland Portion		River Crossing Portion	
		As per Bid requirement	As per Bid Proposal	As per Bid requirement	As per Bid Proposal
OPGW vibration damper					

* Drum length to be finalized after finalization of tower locations as per check survey.

5 INSULATOR SETS & FITTINGS

5.1 400KV LINE (OVERLAND PORTION)

Parameter	Unit	As per Bid requirement				As per Bid Proposal			
		Insulator Set Type							
		Suspension/ Heavy Suspension	Tension	Low Duty Tension	Jumper Suspension	Suspension/ Heavy Suspension	Tension	Low Duty Tension	Jumper Suspension
Insulator unit type no.									
Dielectric material									
Total creepage per unit	mm								
Spacing	mm								
Overall shed diameter	mm								
Puncture voltage	kV								
Electro- mechanical failing load of unit	kN								
Drawing no. of unit									
Type test certificate no.									
Number of units per string	pcs.								
Total creepage of string	mm								
Overall length of set	mm								
Sag adjuster type and step	mm								
Ultimate strength of set	kN								
Mass of set	kg								
Anticipated									
• lightning impulse withstand voltage	kV								



Parameter	Unit	As per Bid requirement				As per Bid Proposal			
		Insulator Set Type							
		Suspension/ Heavy Suspension	Tension	Low Duty Tension	Jumper Suspension	Suspension/ Heavy Suspension	Tension	Low Duty Tension	Jumper Suspension
• Power frequency withstand voltage	kV								
• Corona extinction level	kV								



5.2 400KV LINE (RIVER CROSSING PORTION)

Parameter	Unit	As per Bid requirement		As per Bid Proposal	
		Insulator Set Type			
		Suspension	Tension	Suspension	Tension
Insulator unit type no.					
Dielectric material					
Total creepage per unit	mm				
Spacing	mm				
Overall shed diameter	mm				
Puncture voltage	kV				
Electro-mechanical failing load of unit	kN				
Drawing no. of unit					
Type test certificate no.					
Number of units per string	pcs.				
Total creepage of string	mm				
Overall length of set	mm				
Sag adjuster type and step	mm				
Ultimate strength of set	kN				
Mass of set	kg				
Anticipated					
• lightning impulse withstand voltage	kV				
• Power frequency withstand voltage	kV				
• Corona extinction level	kV				



6 SPACERS AND SPACER DAMPERS

6.1 400KV LINE

Parameter	Unit	As per Bid requirement	As per Bid Proposal	As per Bid requirement	As per Bid Proposal
		Overland		River Crossing	
Unit weight	kg				
Material	-				
Number of spacer dampers to be used for each phase per span*	pcs.				
Total quantity of spacer dampers for one basic span*	pcs.				

* These quantities shall be based on the design of the proposed spacer dampers. The quantities mentioned above may increase at the contractor's cost, if during design approval such increase is necessary.



7 VIBRATION DAMPERS

7.1 400KV LINE

Parameter	Unit	As per Bid requirement	As per Bid Proposal	As per Bid requirement	As per Bid Proposal
		Overland		River Crossing	
Unit weight of vibration dampers					
• for phase conductor	kg				
• for earthwire	kg				
• for OPGW	kg				
Number of vibration dampers to be used for phase conductor per standard span	pcs.				
Number of vibration dampers to be used for earthwire per standard span	pcs.				
Number of vibration dampers to be used for OPGW per standard span	pcs.				

These quantities shall be based on the design of the proposed vibration dampers. Actual number of vibration damper will be decided according to the Manufacturer's recommendation for each span.



8 400KV AIR INSULATED SWITCHGEAR (AIS)

Sl. No.	Description	Unit	400kV
1.	Site Condition		
	Max. Altitude above sea level	m	
	Max. Ambient temperature outdoor	°C	
	Min. Ambient temperature outdoor	°C	
	Max. Ambient relative humidity	%	
	Max. Seismic acceleration at floor level		
	- horizontal	g	
	- vertical	g	
2.	Electrical Data		
	Rated Voltage	kV	
	Rated Frequency	Hz	
	Insulation Level		
	- lightning impulse withstand	kVp	
	- switching impulse withstand	kVp	
	- 50 Hz withstand 1 minute	kV	
	Rated continuous current at 40°C ambient temperature		
	- main busbar and bus coupler	A	
	- transformer bay	A	
	- line bay	A	
	Rated short time withstand		
	- current	kA	
	- duration	Sec	
	Rated peak withstand current	kA	
3.	Secondary Circuit		
	Auxiliary voltage		
	- for control and signal	V dc	
	- for remote control	V dc	
	- for heating	V ac	
	- tolerances	%	



9 HV OUTDOOR CIRCUIT BREAKERS

Sl. No.	Description	Unit	Bidders Data
1	Manufacturer		
2	Type Reference (Manufacturer's designation)		
3	Number of Poles		
4	Rated Voltage		
5	Rated frequency		
6	Rated normal current-feeder/transformer/bus coupler	A	
7	Rated breaking currents: Line charging Cable charging Small inductive	kA rms	
8	Rated short-circuit breaking current	kA rms	
9	First pole to clear factor		
10	Rated transient recovery voltage for terminal faults if other than standard	kV	
11	Rated characteristics for short-line faults		
12	Rated short-circuit making current	kA	
13	Rated operating sequence		
14	Rated duration of short-circuit	s	
15	Rated out of phase breaking current	kA	
16	Rated opening time	ms	
17	Rated break time	ms	
18	Rated closing time	ms	
19	Maximum arcing time of any duty cycle to IEC 56	ms	
20	Is circuit-breaker re-strike free	Yes/No	
21	Test Authority		
22	Test Certificate ref.		
23	Rated short time withstand current	kA	
24	Rated duration of short-circuit	s	
25	Rated peak withstand current	kA	
26	Rated insulation levels:		
26.1	Lightning impulse withstand to earth (wave shape 1.2/50μs)	kV pk	
26.2	Lightning impulse withstand across open contacts (wave shape 1.2/50μs)	kV pk	
26.3	Power frequency voltage withstand to earth	kV rms	
26.4	Power frequency voltage withstand across open contacts	kV rms	
27	Rated supply pressure of gas for interruption	MPa (g)	
28	Limits for correct operation max	MPa (g)	



Sl. No.	Description	Unit	Bidders Data
	min	MPa (g)	
29	Frequency of operation	yr ⁻¹	
30	Operating mechanism Manufacturer		
31	Mechanism Type		
32	Trip free/or fixed trip		
33	Is lockout facility fitted?		
34	Closing supply Volts Amps	max/min V A	
35	Rated supply voltage of shunt opening release	V	
36	Current required at rated supply voltage to open circuit-breaker	A	
37	Spring charging motor - Current - Voltage AC/DC	A V	
38	Number of auxiliary switch contacts - normally open - normally closed - adjustable		
39	Other auxiliary loads: Voltage: Current:		
40	Degree of Protection for (a) auxiliary circuits (b) moving parts		
41	Minimum clearances in air: (a) between phases (b) phases to earth (c) across interrupters (d) live parts to ground level	mm mm mm mm	
42	Minimum creepage (a) to earth (b) across interrupter terminals	mm mm	
43	Radio interference voltage	μV	
44	Guaranteed maximum gas leakage	% per annum	
45	Number of interrupters per pole		
46	Material of interrupter chamber		
47	Wall thickness of interrupter chamber	mm	
48	Material of contact surfaces primary arcing		
49	Length of each break	mm	
50	Length of stroke	mm	
51	Operating rod for moving contact(s) material		



Sl. No.	Description	Unit	Bidders Data
	dimensions, etc.		
52	Weight of circuit-breaker unit complete	kg	
53	Maximum shock load imposed on floor or foundations when opening under fault conditions (state whether tension or compression)	kg	
54	Quantity of gas in complete three-phase circuit breaker		
55	Maximum pressure rise in circuit breakers due to the making or breaking of rated current		
56	Routine pressure test on circuit-breaker tanks or containers		
57	Pressure type test on circuit-breaker tanks or containers		
58	Interrupting gas pressure at 20°C Normal		
59	Limits of gas pressure at 20°C Maximum Minimum		
60	Period of time equipment has been in commercial operation		
61	Number of the same type of circuit breakers supplied to date		
62	Pre insertion Resistor (PIR) for 400kV	OHM	
63	Pre insertion time	ms	



10 DISCONNECTORS AND EARTHING SWITCHES

Sl. No.	Description	Unit	Bidders Data
1	Manufacturer		
2	Type Number		
3	Operating type		
	(a) horizontal/vertical break		
	(b) Pantograph		
	(c) Number of support insulation for pole		
	(d) Number of breaks per pole		
	(e) Material of contact surfaces		
	(f) Type of Contacts		
4	Rated normal current	A	
5	Rated short time withstand current	kA, rms	
6	Rated duration of short time current	S	
7	Rated peak withstand current	kA pk	
8	Rated insulation levels:		
8.1	Lightning impulse withstand to earth (waveshape: 1.2/50μs)	kV pk	
8.2	Lightning impulse withstand across open contacts (waveshape: 1.2/50μs)	kV pk	
8.3	Power frequency voltage withstand to earth	kV rms	
8.4	Power frequency voltage withstand across open contacts	kV rms	
9	Contact Resistance		
10	Method of operation		
11	Type of operating mechanism manual/power		
12	Operating power		
13	Voltage/pressure rated max min	V/MPa(g) V/MPa(g) V/MPa(g)	
14	Auxiliary Consumption	A	
16	Operating time: close max min	ms ms	
17	Manual operating torque	kNm	
18	Load switching capability Inductive Capacitive	A	
19	Mechanical Terminal Load	N	
20	Insulator Creepage	mm	
21	Radio interference voltage	mV	
22	Number of auxiliary switches		



Sl. No.	Description	Unit	Bidders Data
	<ul style="list-style-type: none"> - normally open - normally closed - adjustable 		
23	Other auxiliary loads <ul style="list-style-type: none"> - voltage - current 		
	Mechanical endurance:		
24	Number of operations carried out for mechanical operation test		
25	Degree of protection for <ul style="list-style-type: none"> 1) auxiliary circuits 2) moving parts 		
26	Total weight of three pole disconnector complete	kg	
27	Type test certificate date/reference		
28	Period of time equipment has been in commercial operation		
29	Number of the same type of disconnectors supplied to date		



11 CURRENT TRANSFORMERS

Sl. No.	Description	Unit	Bidders Data
1	Manufacturer/type		
2	Rated primary current	A rms	
3	Rated secondary current	A rms	
4	Rated frequency	Hz	
5	Highest voltage for equipment	kV	
6	Rated insulation level - primary winding	kV	
7	Lightning impulse withstand	kV pk	
8	(a) Power frequency withstand (dry) (b) Power frequency withstand (wet)	kV rms kV rms	
9	Insulator creepage (phase to earth)	mm	
10	Electrical dissipation factor at power frequency test voltage		
11	Radio influence voltage measured at $U/\sqrt{3}$ 1 MHz	μ V	
12a	Rated short term thermal current for 1s	A rms	
12b	Rated short term thermal current for 3s	A rms	
13	Rated dynamic current	kA pk	
14	Insulation class		
15	Number of secondary windings		
	Location of core		
	Core 1 Rated output Accuracy class * Accuracy limit factor Resistance ^a		
	Core 2 Rated output Accuracy class * Accuracy limit factor Resistance ^a		
	Core 3 Rated output Accuracy class * Accuracy limit factor Resistance ^a		
	Core 4 Rated output Accuracy class * Accuracy limit factor Resistance ^a		
	Class X winding: - Rated knee point emf - Exciting current - Resistance ^a *including instrument security factor where applicable	V A	
16	Is earth screen fitted between primary & secondary windings		
17	Maximum cantilever strength	Nm	
18	Type test certificate ref/date		

a. Preliminary value. Actual shall be as per Detail Engineering during execution



12 VOLTAGE TRANSFORMERS

Sl. No.	Description	Unit	Bidder's Data
1	Manufacturer	-	
2	Type No.	-	
3	Transformer type	-	
4	Rated primary voltage	kV rms	
5	Rated Impedance		
6	Rated secondary voltage for each secondary winding	kV rms	
7	Accuracy class for each winding Rated output for each winding	VA	
8	Rated voltage factor		
9	Type of Insulation		
10	Maximum temperature rise	°C	
11	Short-circuit withstand capability	kA rms	
12	Primary insulation		
12.1	Lightning impulse withstand dry	kV pk	
12.2	(a) Power frequency withstand wet (b) Power frequency withstand dry	kV rms kV rms	
13	Partial discharge magnitude	pC	
14	Total external creepage distance	mm	
15	Radio influence voltage measured at 1.1 Um/√3 at 1 MHz	μV	
16	Total installed weight	Kg	
17	Capacitance		
17.1	High voltage capacitance (C1)	pF	
17.2	Intermediate - voltage capacitance (C2)	pF	
17.3	Total Capacitance (C _T)	pF	
18	Open circuit intermediate voltage	kV	
19	Rated open-circuit intermediate voltage	kV	
20	Reference range of frequency	+/- Hz	
21	Reference range of temperature	°C	
22	No. of Protective devices to limit overvoltage & location		



13 SURGE ARRESTERS

Sl. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Model Number		
3	Type:		
4	Applicable Standard		
5	System Earthing		
6	Rated Frequency		
7	Rated system voltage		
8	Highest system voltage		
9	Continuous operating voltage	kV rms	
10	Rated voltage	kV rms	
11	Standard nominal discharge current	kA	
12	Reference current at ambient temperature	mA	
13	Reference voltage for above item no. 7	kV rms	
14	Currents at MCOV		
15	Residual Voltage		
16	Steep current impulse residual voltage	kV pk	
17	Protective Ratio		
18	Lightning impulse residual voltage at 5kA 10kA 20kA	kV pk kV pk kV pk	
19	Duty Class		
20	Discharge class		
21	Pressure relief class		
22	Minimum Energy Discharge Capability		
23	Temporary Over Voltage Capability at 0.1s 1s 10s 100s		
24	Nominal diameter of resistor blocks	mm	
25	Number of resistor blocks connected electrically in parallel		
26	Number of separately housed units per phase		
27	Overall height of arrester (without supporting structure)	m	
28	Overall height of arrester including grading ring if applicable	mm	
29	Clearances: phase to earth (from centre line)	mm mm	



Sl. No.	Description	Unit	Bidder's Data
	phase to phase (centre line to centre line)		
30	Overall Weight of arrester (without supporting structure)	kg	
31	Maximum cantilever strength	Nm	
32	Maximum force due to wind (at maximum specified gust speed)	Nm	
33	Minimum creepage distance over insulator housing	mm	
34	Insulator shed profile - Reference Document		
35	Terminal palm details - Drawing No.		
36	Earthing terminal - Drawing No.		
37	Type & Description of surge monitoring device		
38	Type test certificate ref/date		
39	Number of the same type of surge arresters supplied to date		



14 DIGITAL FAULT AND DISTURBANCE RECORDER [DFDR]

SL. No.	Description	UNITS	BIDDER'S DATA
(A)	GENERAL		
1	Manufacturer's name & address		
2	Type		
3	Power Supply -power Supply for printer	VDC VAC	
(B)	ANALOGUE INPUTS		
1	Number of Channel For: Gopalganj: Expandability Aminbazar: Expandability		
2	Nominal Current	Amp	
3	Nominal voltage - Current	Vac/Vdc mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for chosen sampling rate	Yes/No	
	(d) Simultaneously programmable sampling rate for all feeders/inputs -Locally Changeable -Remotely Changeable	Yes/No Yes/No	
	(e) Possible sampling rates	Samples/sec Samples/sec Samples/sec	
6	DC coupled inputs	Yes/No	
7	Resolution	bits	
8	Accuracy	%	
9	Burden 1. Current Circuit at IN 2. Voltage Circuit	VA VA	
10	Overload 1. Current 2. Voltage circuit	% In % Vn	
(C)	DIGITAL INPUTS		
1	Number of Channel -Expandability (Without and time skew)		
2	Selectable input level	Vdc	
3	Type		



SL. No.	Description	UNITS	BIDDER'S DATA
4	Resolution	Ms	
(D)	MEMORY		
1	Size	MB	
2	Type		
3	Pre-fault time (fast scanning rate)	sec	
4	Post-fault (fast scanning rate)	sec	
5	Pre and Post-fault time (slow scanning rate)	sec	
6	In-Built hard disk (auto-maintained)	GB	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/triggers are preferable Programmable and Virtually recordable	Yes/No	
1.	Logical combination sensor	Yes/No	
2.	Three phase over or under Voltage / Current	Yes/No	
3.	Mono phase over or under Voltage / Current	Yes/No	
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases], df/dt. etc.	Yes/No	
5.	RMS [Voltage / Current]	Yes/No	
6.	Zero Sequence	Yes/No	
7.	Negative, Positive Sequence	Yes/No	
8.	Frequency	Yes/No	
9.	DC Step	Yes/No	
10.	Pending / Swing	Yes/No	
11.	Digital level and edge	Yes/No	
12.	Sensor trigger	Yes/No	
13.	Event Trigger	Yes/No	
14.	Manual Trigger	Yes/No	
15.	Remote Trigger	Yes/No	
(F)	CLOCK SYSTEM		
1.	Internal Clock	Yes/No	
2.	Accuracy		
3.	External Synchronization	Yes/No	
4.	Time resolution between 2 synchronized pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	
2.	Make and carry for 0.5 sec	A	
3.	Carry Continuously	A	
4.	Break (DC) – resistive	W	



SL. No.	Description	UNITS	BIDDER'S DATA
(H)	INTERFACE FOR DATA COMMUNICATION		
1.	Full definition compression	Yes/No	
2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	
4.	Printer Port	Yes/No	
5.	Dedicated serial port for modem	Yes/No	
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scale (mm/s)		
3.	Printer resolution	mm	
4.	Auto printing	Yes/No	
(J)	Fault Priority transmission	Yes/No	
(K)	Fault location (distance calculation)	Yes/No	
(L)	Test certificates from internationally recognized Laboratories	Yes/No	
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		
	1. Processor Pentium	(MHz) Yes/No	
	2. Co-Processor pentium	Yes/No	
	3. Main memory capacity	(Mb) Yes/No	
	4. Color graphics board S-VGA	Yes/No	
	5. Screen S-VGA	Yes/No	
	6. Hard disk unit	Yes/No	
	7. Printer	Yes/No	
	8. Modem	Yes/No	
*Note: du/dt=Change of voltage, dp/dt=Change of active power, dq/dt=change of reactive power, df/dt=Change of frequency.			



15 FIBRE OPTIC MULTIPLEXER EQUIPMENT

SL. No.	Description	Unit	Bidder's Data
1	GENERAL:		
	Manufacturer		
	Model No.		
	Type		
	Type of multiplexer		
	Complying to ITU-T rec.		
	Transmission Capacity	Mbit/s	
	Access capacity on 64 kbit/s	channels	
	Access capacity on 2 Mbit/s	channels	
	Redundant central processor		
	Digital cross connect function		
2	Available AGGREGATES:		
	Optical aggregates (ITU-T G.957)		
3	Available TRUNK INTERFACES:		
	HDB3, 2 Mbit/s interfaces per module	No.	
	Complying to ITU-T rec.		
	HDSL, 2Mbit/s interface: no of copper wires - Capacity on 2Mbit/s or on 1Mbit/s - Capacity selectable	No. ch ch / pair of wire	
4	Available USER INTERFACES		
5	Voice interfaces for trunk lines:		
	1 + 1 com path protection, available for all		
	Analogue, 4wire with E&M: Input level	dBr	
	Output level	dBr	
	Analogue, 2wire with E&M: Input level	dBr	
	Output level	dBr	
	Digital, 2Mbit/s CAS or PRI		
6	Voice interfaces for remote Subscriber:		
	2wire, subscriber side	dBr	
	2wire, PABX side	dBr	
7	Integrated teleprotection		
8	Interface for Commands:		
	Number of independent commands	No.	
	Transmission time max.	ms	
	Signal voltage	Vpeak	
	1 + 1 com path protection		
9	Interface(s) for Differential Protection:		
	Electrical interface: G.703	kbit/s	
	Optical Interface	kbit/s	
10	Data: channels per module		
	1 + 1 com path protection, available for all		
	V.24/V.28 (RS-232): up to 38.4kbit/s	No.	
	V.11/X.24 (RS-422): 64kbit/s	No.	
	V.35: 64kbit/s	No.	
	V.36 (RS-449): 64kbit/s	No.	



SL. No.	Description	Unit	Bidder's Data
	G.703: 64kbit/s	No.	
	Ethernet: 10/100 BaseT	No.	
	WAN capacity	Mbit/s	
	Protocols	Mbit/s	
11	Integrated alarm gathering module:		
	Number of external alarms per module	No.	
	Auxiliary power supply for ext. contacts		
12	Network Management System		
	Type/Name of configuration tool		
	For fault / configuration management		
	For local / remote operation		
	Data communication network (DCN)		
13	Ambient Conditions:		
	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	
	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	
	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	
14	Power Supply		
	Operation	VDC	
	Fully redundant power supply		

Bidder shall provide all necessary information which deem to be necessary to complete the project in all respects.



16 400 KV LINE DISTANCE PROTECTION (MAIN 1)

SL. No.	Description	Unit	Bidder's Data	
			Payra Line 3 & 4 and Aminbazar Line 3 & 4	Gopalganj Line 3 & 4
1	Manufacturer			
2	Type designations			
3	Phase switched			
4	Zone switched			
5	Number of zones			
6	Shape of impedance characteristic: Zone 1/Zone 2/Zone 3			
7	Reverse looking element (blocking signal initiation)			
8	Sensitivity:			
8.1	Minimum operation current: Earth faults/Phase faults	A		
8.2	Minimum necessary voltage for fault at Zone 1 reach point (if applicable): Earth faults/Phase faults	V		
8.3	Minimum Zone 1 ohmic impedance to which relay can be set	ohms		
8.4	Maximum Zone 1 ohmic impedance to which relay can be set and maintain accuracy	ohms		
8.5	Minimum Zone 2 ohmic impedance to which relay can be set	ohms		
8.6	Maximum Zone 2 ohmic impedance to which relay can be set and maintain accuracy	ohms		
8.7	Maximum Xone 3 ohmic reach: Forward reach/Reverse reach	ohms		
9	Arc forward and reverse reach setting independent of each other?	Yes/No		
10	Can resistance and reactance reaches be set independent of each other	Yes/No		
11	Directional sensitivity	V		
12	Current transformer requirements			
13	Voltage transformer requirements			
14	Back up Zone time ranges: Zone 2/ Zone 3	sec.		
15	Method used to clear close-in faults:			
	which occur when line is already energized in service			
	which exist upon line energisation			
16	Has distance protection previously been used in the type of blocking scheme offered for this contract?	Yes/No		



SL. No.	Description	Unit	Bidder's Data	
			Payra Line 3 & 4 and Aminbazar Line 3 & 4	Gopalganj Line 3 & 4
	If yes: number of scheme in service/year first in service			
17	Approximate number of years distance relay in service (A complete reference list should be submitted stating client, system voltage and year of going into service).			
18	Zone 1 operating times on fault position:			
	Earth faults: 0, 50, 90% of relay setting	ms (min./max.)		
	Phase to phase faults: 0, 50, 90% of relay setting	ms (min./max.)		
	Three phase faults: 0, 50, 90% of relay setting	ms (min./max.)		



17 400KV LINE DIRECTIONAL EARTH FAULT PROTECTION (MAIN 1 BU)

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Current setting range: Forward element/Reverse element	A	
4	Minimum polarizing quantity required for correct directional decision:		
	Voltage: Forward element/Reverse element	V	
	Current: Forward element/Reverse element	V	
5	Characteristic angle	Degree	
6	Time ranges: Blocking scheme/Back up	sec	
7	Has protection previously been used in the blocking scheme offered for this contract?	Yes/No	
8	Current transformer requirements		



18 400KV LINE DISTANCE PROTECTION FOR PAYRA & AMINBAZAR – I & II (MAIN 2)

SL. No.	Description	Unit	Bidder's Data	
			Payra Line 3 & 4 and Aminbazar Line 3 & 4	Gopalganj Line 3 & 4
1	Manufacturer			
2	Type designations			
3	Range of operating coil settings	% of CT rating		
4	Range of bias coil settings	% of CT rating		
5	Recommended operating coil setting	% of CT rating		
6	Recommended bias coil settings	% of CT rating		
7	Number of bias coils			
8	Minimum sensitivity: Earth faults/Phase faults	% of CT rating		
9	Maximum through fault at which the protective equipment is stable with recommended settings: Earth faults/Phase faults	% of CT rating		
10	Inter trip: Operating time/Reset time	ms		
11	Permissive inter trip:			
	Time delay setting	ms		
	Operating time after delay setting	ms		
	Reset time	ms		
12	Maximum time delay between initiation of fault and emerging of breaker trip circuit			
13	Current transformer requirement			



19 400 KV BUSBAR PROTECTION

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Operating principle, e.g. high impedance		
4	Minimum relay setting	A	
5	Sensitivity of scheme (allowing for CT magnetizing current, etc.)		
6	Maximum through fault current at which protection is stable	A	
7	Current transformer requirements		
8	Estimated magnetizing current at relay setting	A	
9	Operating time at twice relay minimum setting	ms	
10	Operating time at ten times relay minimum setting	ms	



20 400 KV DIRECTIONAL OVERCURRENT AND EARTH FAULT PROTECTION

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Current setting range: Forward element/Reverse element	A	
4	Minimum polarizing quantity required for correct directional decision:		
	Voltage: Forward element/Reverse element	V	
	Current: Forward element/Reverse element	V	
5	Characteristic angle	degrees	
6	Current transformer requirements		



21 BREAKER FAILURE PROTECTION

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Setting of current elements: Phase faults/Earth faults	A	
4	Timer setting range	sec.	
5	Burden of relay at minimum current setting at ten times CT secondary rated current during: Phase faults/Earth faults	VA	
6	Operating time/Reset time	ms	



22 TRIPPING RELAYS

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Nominal operating voltage	V	
4	Minimum operating voltage	V	
5	Operation indicator		
6	Operating time at nominal voltage	ms	
7	Contact rating:		
	Make and carry continuously	VA	
	Make and carry for 3 sec.	VA	
	Break: resistive inductive	W VA	



23 OVERALL FAULT CLEARANCE TIMES

SL. No.	Description	Unit	Bidder's Data
1	400 kV Busbar Faults:		
	Main protection relay operating time	ms	
	Auxiliary and tripping relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	
5	Gopalganj-Payra 400 kV Line Faults		
5.1	Fault Clearance at Gopalganj		
	Distance protection maximum operating time	ms	
	Permissive scheme time delay	ms	
	Auxiliary relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	
5.2	Fault Clearance at Payra		
	Distance protection maximum operating time	ms	
	Permissive scheme time delay	ms	
	Auxiliary relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	
	Gopalganj-Aminbazar 400 kV Line Faults		
5.3	Fault Clearance at Gopalganj		
	Distance protection maximum operating time	ms	
	Permissive scheme time delay	ms	
	Auxiliary relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	
5.4	Fault Clearance at Aminbazar		
	Distance protection maximum operating time	ms	
	Permissive scheme time delay	ms	
	Auxiliary relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	



24 SHUNT REACTOR

SL	Description	Unit	Bidders Data
1.	Name of manufacturer		
2.	Model		
3.	Service conditions: - External cooling medium - Altitude not exceeding - Air temperature not exceeding Average air temperature in any one year not exceeding: - In any one day - Average in one year	- m °C °C °C	
4.	Rated voltage	kV	
5.	Rated lightning impulse withstand voltage - HV - Neutral	kV	
6.	Rated switching impulse withstand voltage - HV - Neutral	kV	
7.	Rated power Frequency withstand voltage - HV - Neutral	kV	
8.	Rated Capacity		
9.	Vector Group		
10.	Method of Earthing		
11.	Maximum temperature Rise - windings - Top oil - Hot spot of Core	°C	
12.	Total Losses at rated voltage & frequency - Core Loss - Copper Loss - Total	kW	
13.	Cooling		
14.	Rated Power at Rated voltage & frequency	MVar	
15.	Rated Current	A	
16.	Rated reactance/phase	Ω	
17.	Zero sequence reactance	Ω	
18.	Mutual Reactance	Ω	
19.	Linearity Range of magnetic circuit percent to rated voltage	%	
20.	Reactance during saturation percent to rated reactance	%	
21.	Harmonics - Even - Total	%	
22.	Core Design	Gapped/Air Core	
23.	No. of Core	No's	
24.	Material & type of Core		
25.	Type of winding		
26.	Winding Connection brazed or crimped		



SL	Description	Unit	Bidders Data
27.	Type of Insulation - HV side - Neutral side	Non/Uniform	
28.	Flux Density at Rated voltage & frequency - Core - Yokes	T	
29.	Volts per turn		
30.	Efficiency	%	
31.	Regulation - At unity power factor - At 0.8 lagging power factor	%	
32.	Bushing Current Transformer -Ratio -Class -Burden	-- -- VA	
33.	Maximum Sound Pressure level	dB	
34.	Oil Type		
35.	Weight of Active part	kg	
36.	Weight of Oil*	kg	
37.	Total weight*	kg	
38.	Heaviest part for shipment	kg	

*These values are required for Foundation design & shipping purpose only. During detail design, these values may vary from Bid value due to attaining desired electrical output.



25 OTHERS

Sl. No.	Description	Unit	Bidder's Data
1	Structural Steel		
	Type and standard specification		
	Manufacturer and country		
	Minimum yield strength	Kg/ mm ²	
	Ultimate tensile strength	Kg/ mm ²	
2	Copper Conductors for Earthing system		
	Type and standard specification		
	Manufacturer and country		
	Conductor material		
	Size of conductors (Solid copper rods)	mm ²	
	Size of conductors (Flat copper bars) (Width×Thickness×Bundles)	mm	
	Rated current	A	
	Short time withstand current	kA rms	
	Peak withstand current	kA pk	
3	High Voltage Bus Work		
3.1	Switchyard Conductor		
3.1.1	Tubular Conductors for Busbar		
	Type and standard specification		
	Manufacturer and country		
	Inner diameter	mm	
	Outer diameter	mm	
	Rated continuous current (site rating)	A rms	
	Temperature rise at rated current	°C	
	Rated short time current	kA rms	
	Peak withstand current	kA pk	
	Weight	kg/m	
	Moment of inertia	kg-m ²	
3.1.2	Busbar conductor for Baybus connection		
	Type and standard specification		
	Manufacturer and country		
	Conductor type		
	Conductor size		
	Standing		
	- No. of Al wires		
	- Dia. Of each wire	mm	
	Overall conductor dia.	Mm	



Sl. No.	Description	Unit	Bidder's Data
	Cross-sectional area	mm ²	
	Rated continuous current (site rating)	A rms	
	Temperature rise at rated current	°C	
	Rated short time current	kA rms	
	Peak withstand current	kA pk	
	Rated ultimate tensile strength	kN	
	Mass, nominal	kg/m	
	No. of conductors per bundle		
	Bundle configuration		
	Bundle spacing		
3.1.3	Flexible Bus Conductor		
	Type and standard specification		
	Manufacturer and country		
	Conductor type		
	Conductor size		
	Standing <ul style="list-style-type: none"> No. of Al wires Dia. Of each wire 	mm	
	Overall conductor dia.	Mm	
	Cross-sectional area	mm ²	
	Rated continuous current (site rating)	A rms	
	Temperature rise at rated current	°C	
	Rated short time current	kA rms	
	Peak withstand current	kA pk	
	Rated ultimate tensile strength	kN	
	Mass, nominal	kg/m	
	No. of conductors per bundle		
	Bundle configuration		
	Bundle spacing		
3.1.3	Shield Wire		
	Type and standard specification		
	Manufacturer and country		
	Dia. of galvanized steel wire	mm	
	Stranding <ul style="list-style-type: none"> No. of Al wires Dia. Of each wire 	mm	
	Grade of wire		
	Weight of wire	kg/km	
	Minimum breaking strength of wire	kN	



Sl. No.	Description	Unit	Bidder's Data
3.2	Insulators		
3.2.1	Station Post Type (for rigid Busbar)		
	Type and standard specification		
	Manufacturer and country		
	Insulator unit, length/height	mm	
	No. of units in each insulator		
	Power frequency flashover voltage		
	- Dry	kV	
	- Wet	kV	
	Impulse flashover voltage		
	- Positive	kV	
	- Negative	kV	
	Power frequency withstand voltage		
	- 1 min. dry	kV	
	- 10 sec. wet	kV	
	Power frequency puncture voltage	kV	
	Switching impulse withstand voltage, wet	kV pk	
	Lightning impulse withstand voltage	kV pk	
	Radio interference voltage		
	- Test voltage to ground	kV rms	
	- Max. RIV at $1.1 \times U_r / 3$ line to ground voltage, when tested as per IEC 60694	micro V	
	Leakage distance	mm	
	Mechanical values, failing load (min.)		
	- Cantilever strength	N	
	- Tensile strength	N	
	- Torsional strength	N-m	
	- Compressional strength	N	
	- Combined electrical and mechanical strength	N	
	- Impact strength	N-m	
3.2.2	String Type		
	Type and standard specification		
	Manufacturer and country		
	Insulator unit, length	mm	
	No. of units in each insulator		
	No. of insulator strings per conductor (at each end)		
	Dia. of disc	mm	
	Disc spacing	mm	
	Power frequency flashover voltage	kV	

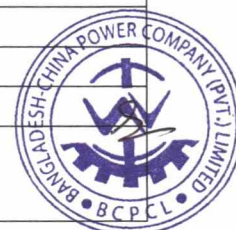


Sl. No.	Description	Unit	Bidder's Data
	- Dry - Wet	kV	
	Impulse flashover voltage - Positive - Negative	kV kV	
	Power frequency withstand voltage - 1 min. dry - 10 sec. wet	kV kV	
	Power frequency puncture voltage	kV	
	Switching impulse withstand voltage, wet	kV pk	
	Lightning impulse withstand voltage	kV pk	
	Dry arcing distance	mm	
	Radio interference voltage - Test voltage to ground - Max. RIV at $1.1 \times U_r / \sqrt{3}$ line to ground voltage, when tested as per IEC 60694	kV rms micro V	
	Leakage distance	mm	
	Mechanical values, failing load (min.) - Tensile strength - Torsional strength - Compressional strength - Combined electrical and mechanical strength - Impact strength	N N-m N N N-m	
3.3	Clamps and Fittings		
	Type and standard specification		
	Manufacturer and country		
	Maximum working stresses		
	All accessories for installation (bolts, nuts, etc.)		



26 POWER LINE CARRIER EQUIPMENT

SI No.	Description	Bidder's Data
26.1	Line Trap	
1.	Manufacturer/model	
2.	Type	
3.	Rated continuous current	
4.	Coil inductance	
5.	Air temperature operating range	
6.	Weight of trap	
7.	Type of protective device	
8.	Temperature rise at normal rating	
9.	Dynamic short circuit rating	
10.	Temperature rise at short circuit rating	
11.	Working tension of strain (mounted units)	
12.	Bandwidth blocked band	
13.	Minimum impedance in working bandwidth	
14.	Compatibility with IEC Recommendation 353	
15.	Mounting details	
16.	MTBF	
17.	Design Life	
18.	Equipment technical description	
26.2	HF Coupling Unit	
1.	Manufacturer/model	
2.	Type	
3.	Working temperature range	
4.	Available bandwidth	
5.	Tuning range	
6.	Composite loss over tuning range	
7.	Line side impedance range for phase/phase coupling	
8.	Equipment side impedance	
9.	Drain coil current carrying <ul style="list-style-type: none"> • continuous • for 1 second • for 3 seconds 	
10.	Isolation transformer voltage withstand for 1 minute	
11.	Main arrestor voltage	
12.	Earth switch interlock with door	
13.	Compatibility with IEC Recommendation 481	
26.3	High Frequency Cable	
1.	Manufacturer	
2.	Type	
3.	Coaxial or quad	
4.	Surge impedance	
5.	Voltage withstand: <ul style="list-style-type: none"> • between conductors • between cores and armouring 	



SI No.	Description	Bidder's Data
	Attenuation per km: • at 50 kHz • at 400 kHz	
26.4	Digital PLC Terminal	
1.	Manufacturer/model	
2.	Type	
3.	Compliance with relevant parts of IEC 495	
4.	DC voltage working range	
5.	Service conditions (temperature and RH)	
6.	Power consumption	
7.	Design life	
8.	Carrier frequency range	
9.	Gross bandwidth	
10.	Teleprotection equipment mounted within the PLC units	
11.	Technical description of the equipment	
12.	Type of coupling (phase/phase or inter circuit)	
13.	Return loss within the carrier frequency band	
14.	Transmission rate of the digital signal	
15.	Output impedance	
16.	Dynamic range of receiver for digital signal	
17.	Means of RF frequency selection	
18.	frequency spacing for parallel connections • between two digital PLCs • between a digital and an analogue PLC	
19.	Output power (before hybrid at coaxial cable)	
20.	Channel terminal power at output to coupling equipment	
21.	Type of digital modulation available/proposed	
22.	Calculations to justify operation of the PLC over the transmission lines	
23.	Any limitations in parallelling of terminals (to digital or analogue PLCs)	
24.	Required minimum SNR for minimum BER	
25.	Switching off of parallel PLCs, not to cause interference with working PLCs	
26.	Spurious emissions	
27.	Maximum transmitting level for parasitic signals: • 0-4 kHz from the band limits • 4-8 kHz from the band limits • >8 kHz from the band limits	
28.	Voltage withstand	
29.	Capacity options available for various services equipped within the digital bit stream	
30.	Capacity allocation proposed for this project	
31.	Speech channel 2W/4W interface	
32.	Speech channel impedance/levels	
33.	"Long line" telephone facility	
34.	Speech channel interfaces available (E&M etc.)	
35.	Service telephone	
36.	Type of speech codec	



SI No.	Description	Bidder's Data
37.	Compatibility with analogue speech bands	
38.	Method of telephone signalling	
39.	Frequency response of speech channel (Ref 800 Hz)	
40.	Data channel interface	
41.	Synchronous/asynchronous data channel availability	
42.	Data signalling transmission rates which can be accommodated	
43.	FSK Interface	
44.	VFT signal levels (2W and 4W)	
45.	Frequency response of VFT channel (Ref 3 kHz)	
46.	Test facilities	
47.	Alarm facilities	
48.	Equipment technical description	
49.	Terminal MTBF	
50.	Single or duplicated PSU	
26.5	Teleprotection Equipment	
1.	Manufacturer/model	
2.	Type	
3.	DC voltage working range	
4.	Service conditions (temperature and RH)	
5.	Power consumption	
6.	Configured for analogue or digital communications media	
7.	Design life	
8.	Suitable for direct, permissive, blocking signalling	
9.	Single/duplication of teleprotection signals	
10.	VFT channel allocation and bandwidth	
11.	Frequency or coded signalling	
12.	Use of guard channel	
13.	Signal transmission time	
14.	Modem programmability	
15.	Means of monitoring communications channel	
16.	Transmission of "trip/send" signal at increased level	
17.	No. of signals per terminal	
18.	Facility to hold on output signal	
19.	Trip extension facility/time	
20.	Minimum/maximum input pulse and corresponding output	
21.	No. of receive output contacts	
22.	Provision of counters	
23.	Voltage withstand	
24.	Transmitter level output range	
25.	Receiver sensitivity range	
26.	Receiver alarm level or BER referred to nominal	
27.	Minimum alarm contact closure time	
28.	No. of alarm contacts	
29.	19"/ETSI rack mounting practice	
30.	Information to be submitted with the Tender (a) Technical description	



SI No.	Description	Bidder's Data
	(b) MTBF calculations (c) Performance graphs/details	



SCHEDULE F: PROPOSED SUBCONTRACTORS

The following form shall be filled and attached to the bid. Bidders are free to propose more than one Subcontractor for each item.

The following Subcontractors are proposed for carrying out the facilities:

Item	Service	Subcontractor's Name and Address	Nationality
1	Design		
2	Civil works		
3	Electrical works / installation, testing and commissioning		

Name of Bidder:

Signature of Bidder:



SCHEDULE G: DRAWINGS AND DOCUMENTS TO BE SUBMITTED WITH BID

The following drawings/documents shall be submitted with the Bid:

1. Typical single line, layout & sectional drawings of substation showing details of construction and dimensions.
2. Outline drawings of all switchgear equipment:
 - (a) Showing installed components, dimensions and weights;
 - (b) Showing transport dimensions and weights;
3. Outline drawings of all Shunt Reactor (if any):
 - (a) Showing installed components, dimensions and weights;
 - (b) Showing transport dimensions and weights;
4. Following type test certificates of the equipment of similar or higher specifications (higher voltage & higher capacity) required by the bid shall be submitted as per relevant IEC.

A) Shunt Reactor

- (i) Test of temperature rise
- (ii) Lightning impulse test
- (iii) Switching impulse test
- (iv) Long duration induced AC voltage test (ACLD)
- (v) Separate source AC withstand voltage test
- (vi) Acoustic Sound Pressure Level Measurement
- (vii) Short-circuit tests or Short-circuit Calculations

(Note): Short circuit calculation shall be certified from independent Certifying Authority)

B) GIS Switchgear

Deleted

C) AIS Switchgear

1) Circuit Breaker

- (i) Lightning impulse voltage withstand dry test
- (ii) Temperature rise test
- (iii) Power frequency withstand test
- (iv) Short time withstand and peak withstand current test
- (v) Mechanical operation tests
- (vi) Short circuit current making and breaking test
- (vii) Out of phase making and breaking test

2) Disconnecter and Earthing Switch

- (i) Lightning Impulse voltage withstand dry test
- (ii) Power frequency voltage withstand dry test
- (iii) Short time withstand current test



Note: The Post Insulator (PI) of disconnecter (DS) shall preferably be from DS main part (Contact blade) manufacturer. However, if the PI manufacturer is different from DS main part manufacturer, the type test of the DS must be with the same type PI to be supplied along with the DS under this project; that is, the complete DS assembly, including PI, to be supplied under this project must be type tested.

3) Current Transformer

- (i) Short time current test
- (ii) Impulse voltages withstand tests for current
- (iii) Measurement of Errors
- (iv) Power frequency voltage withstand test
- (v) Temperature rise test

4) Voltage Transformer

- (i) Temperature rise test
- (ii) Impulse voltages withstand tests for voltage transformers for service in exposed installation
- (iii) Short circuit test
- (iv) Short time over voltage test
- (v) Measurement of errors
- (vi) Measurements of partial Discharge level

5) Surge Arrester

- (i) Insulation withstand tests
- (ii) Residual voltage test
- (iii) Long duration current impulse withstand test
- (iv) Operating duty test
- (v) Internal partial discharge test

6) Wave trap

- (i) Impulse voltage test
- (ii) Power frequency voltage test
- (iii) Temperature rise test
- (iv) Radio interference test
- (v) Short time current test
- (vi) Measurement of tapping loss & tapping loss based on the blocking resistance

D) Capacitor

- (i) Thermal stability test
- (ii) Tangent of dielectric loss angle at elevated temperature
- (iii) Voltage test between terminals
- (iv) Impulse voltage test between terminals and container
- (v) Short circuit discharge test
- (vi) Disconnecting test on internal fuses
- (vii) Endurance test (special test in accordance to IEC 60871-2)

E) Power Cable

- (i) Bending test followed by partial discharge test



- (ii) Tan Delta measurement
- (iii) Heating cycle voltage test
- (iv) Impulse withstand test followed by power frequency test
- (v) Short Circuit Capability Test

F) Cable Joint and Termination Kit (Cable Accessories)

- (i) Partial discharge test at ambient temperature & high temperature
- (ii) Heating cycle voltage test
- (iii) Impulse withstand test followed by power frequency test
- (iv) Short Circuit Capability Test

G) Insulator

a) Post Insulator

- (i) Dry lightning-impulse withstand voltage test
- (ii) Dry or wet switching-impulse withstand voltage tests
- (iii) Dry power-frequency withstand voltage test (Indoor PI)
- (iv) Wet power-frequency withstand voltage test (Outdoor PI)

b) Disk/String Insulator

On insulator unit

- (i) Dry lightning impulse voltage withstand test
- (ii) Wet power frequency voltage withstand test
- (iii) Electro-mechanical failing load test
- (iv) Thermal mechanical performance test
- (v) Impulse voltage puncture test
- (vi) Power arc test

On Complete set

- (i) Dry lightning impulse withstand voltage,
- (ii) Wet switching impulse withstand voltage and the power frequency withstand voltage as appropriate
- (iii) Radio Interference & Corona test
- (iv) Power Arc Test

H) DC System

1) Battery

- (i) Test for capacity
- (ii) Test for retention of charge
- (iii) Endurance Test
- (iv) Ampere-hour (at 5 hour rate) and watt-hour efficiency test
- (v) Test for voltage during discharge

2) Battery Charger

- (i) Measurement of voltage regulation / AVR regulation at
 - a) No Load
 - b) Half Load
 - c) Full Load
- (ii) Efficiency and power factor measurement test



- (iii) Temperature rises test so as to determine the temperature rise of SCR, Transformer primary, Secondary and core, Diode, capacitor, choke and cabinet etc.
- (iv) Measurement of insulation resistance:
 - a) AC input to earth.
 - b) AC input to DC output.
 - c) DC output to earth
- (v) DC voltage current characteristic
- (vi) High Voltage Tests
- (vii) Determination of regulation
- (viii) Measurement of ripple at:
 - a) No load
 - b) Half load
 - c) Full load
- (ix) Reverse leakage test

3) DC Distribution Board

- (i) Temperature rise limit
- (ii) Dielectric strength test
- (iii) Short circuit withstand capability test
- (iv) Clearances and creepage distances test
- (v) Resistance to rusting and to humidity
- (vi) Degree of protection

All the offered above equipment except Shunt Reactor must be type tested (for the above-mentioned type tests) in from independent testing laboratory. Such type test reports are required to be submitted with bid.

Type test certificates or reports of Shunt Reactor shall be from independent testing laboratory or manufacturer's own testing laboratory. Test carried out at manufacturer's own testing laboratory must have been witnessed by any one or more of the following persons:

- A representative from an independent testing authority/ laboratory.
- A representative from independent inspection agency.

5. Quality Assurance Certificate ISO9001/9002 Certification (or equivalent) and Quality Assurance Programme and Typical Quality Plan for the work from the manufacturers of the following equipment:

- (i) Switchgears (CB, DS/ES, CT, PT)
- (ii) Relays & substation automation system
- (iii) Fibre Optic Multiplexer Equipment for protection and communication
- (iv) Under ground power cables
- (v) Surge arrester
- (vi) Wave trap
- (vii) Shunt Reactor
- (viii) DFDR
- (ix) Battery and charger



SCHEDULE H: DEPARTURES FROM THE SPECIFICATION

Bidders are to list all departures from the requirements of the specification in this schedule.

All departures whether they be commercial, financial, technical or of a contractual nature are to be included and shall be submitted with the Technical proposal

Any item that does not have a departure listed in this schedule will be deemed to be in full accordance with the requirements of the specification.

No other document or detail accompanying the tender will be considered in evaluating departures. Bidders are not permitted to offer any alternative to this schedule.

Item	Volume	Section	Clause	Detail of Departure from Specification



ATTACHMENT A: FEASIBILITY STUDY





SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P1	Towers					
	Supply of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.					
	Overland Portion					
P1.1	Tower type 4DL					
P1.1.1	Tower type 4DL Standard		each	21		
P1.1.2	Tower type 4DL E1.5		each	15		
P1.1.3	Tower type 4DL E3		each	25		
P1.1.4	Tower type 4DL E4.5		each	50		
P1.1.5	Tower type 4DL E6		each	80		
P1.1.6	Tower type 4DL E9		each	140		
P1.2	Tower type 4D1					
P1.2.1	Tower type 4D1 Standard		each	1		
P1.2.2	Tower type 4D1 E1.5		each	1		
P1.2.3	Tower type 4D1 E3		each	1		
P1.2.4	Tower type 4D1 E4.5		each	1		
P1.2.5	Tower type 4D1 E6		each	2		
P1.2.6	Tower type 4D1 E9		each	1		
P1.2.7	Tower type 4D1 E12		each	1		
P1.2.8	Tower type 4D1 E15		each	4		
P1.2.9	Tower type 4D1 E20		each	4		
P1.2.10	Tower type 4D1 E25		each	3		
P1.2.11	Tower type 4D1 E30		each	3		
P1.2.12	Tower type 4D1 E40		each	2		
P1.3	Tower type 4D25 (4DXP)					
P1.3.1	Tower type 4D25 Standard		each	1		
P1.3.2	Tower type 4D25 E1.5		each	1		
P1.3.3	Tower type 4D25 E3		each	7		
P1.3.4	Tower type 4D25 E4.5		each	1		
P1.3.5	Tower type 4D25 E6		each	6		
P1.3.6	Tower type 4D25 E9		each	12		
P1.3.7	Tower type 4D25(4DXP) E6		each	2		
P1.4	Tower Type 4D45					
P1.4.1	Tower type 4D45 Standard		each	1		
P1.4.2	Tower type 4D45 E1.5		each	1		
P1.4.3	Tower type 4D45 E3		each	4		
P1.4.4	Tower type 4D45 E4.5		each	1		
P1.4.5	Tower type 4D45 E6		each	14		
P1.4.6	Tower type 4D45 E9		each	6		
P1.5	Tower Type 4DT6					
P1.5.1	Tower type 4DT6 Standard		each	1		
P1.5.2	Tower type 4DT6 E1.5		each	1		
P1.5.3	Tower type 4DT6 E3		each	1		
P1.5.4	Tower type 4DT6 E4.5		each	1		
P1.5.5	Tower type 4DT6 E6		each	1		
P1.5.6	Tower type 4DT6 E9		each	3		
	River Crossing Portion (Item P1.6 and P1.7)					



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P1.6	Tower Type 4DR					
P1.6.1	Tower Type 4DR1 Standard		each	2		
P1.6.2	Tower Type 4DR1 E10		each	2		
P1.6.3	Tower Type 4DR1 E30		each	2		
P1.6.4	Tower Type 4DR2		each	2		
P1.7	Tower Type 4DAX					
P1.7.1	Tower Type 4DAX Standard		each	8		
P1.8	Auxiliary Crossarm for tower					
P1.8.1	Auxiliary crossarm for tower type 4DT6		per set of three	2		
P1.9	Air Craft Obstruction Lights					
P1.9.1	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	14		
P1.10	Tower Test					
P1.10.1	Tower load test to prove compliance with specification. Payment for successful test only. Tested Tower to be supplied to the Employer's store as per technical specification.					
(a)	Contractor to fill up, if required					
(b)	Contractor to fill up, if required					
(c)	Contractor to fill up, if required					
(d)	Contractor to fill up, if required					
P1.11	Supply of insulator and fittings:					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn, Arcing ring etc					
P1.11.1	400kV Overland Portion					
P1.11.1.1	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Suspension) - disc only		set	1,986		
	b) 210kN twin suspension Insulators Fittings set for Quad Bundle ACSR Finch Conductor (Suspension) - hardware fittings only		set	1,986		
P1.11.1.2	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Heavy Suspension) - disc only		set	144		
	b) 210kN twin suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	144		
P1.11.1.3	a) 210kN jumper suspension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	486		
	b) 210kN jumper suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	486		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P1.11.1.4	a) 400kN twin tension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	816		
	b) 400kN twin tension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	816		
P1.11.1.5	a) 210kN single upright low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single upright low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		
P1.11.1.6	a) 210kN single inverted low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single inverted low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		
P1.11.1.7	Spacer damper for Quad Bundle ACSR Finch Conductor		span-phase	2,538		
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasexN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.					
P1.11.1.8	Vibration Damper for Quad Bundle ACSR Finch Conductor		span	423		
P1.11.1.9	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	1182		
P1.11.1.10	Vibration damper for ACSR "Dorking" earthwire		span	423		
P1.11.1.11	Suspension set for ACSR "Dorking" earthwire		each	331		
P1.11.1.12	Tension set for ACSR "Dorking" earthwire		each	138		
P1.11.1.13	Vibration Damper for ACSR Dorking earthwire equivalent OPGW		span	423		
P1.11.1.14	Suspension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	331		
P1.11.1.15	Tension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	138		
P1.11.1.16	Counterweights for 210kN suspension insulator sets complete with yoke plate attachment bolts to be used for 4D1 towers:					
(a)	- 40kg set		each	8		
(b)	- 80kg set		each	6		
(c)	- 120kg set		each	10		
P1.11.2	400kV River Crossing Portion					
P1.11.2.1	a) 300kN tripple suspension Insulators set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - disc only		set	36		
	b) 300kN tripple suspension Insulators Fittings set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - hardware fittings only		set	36		
P1.11.2.2	a) 300kN tripple suspension Insulators set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - disc only		set	12		
	b) 300kN tripple suspension Insulators Fittings set with double AGS Clamp for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - hardware fittings only		set	12		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P1.11.2.3	a) 400kN tripple tension Insulators Set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor - disc only		set	48		
	b) 400kN tripple tension Insulators Fittings Set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor - hardware fittings only		set	48		
P1.11.2.4	Spacer damper for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		span-phase	72		
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasesxN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.					
P1.11.2.5	Vibration Damper for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		span	12		
P1.11.2.6	Jumper Spacer for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		each	144		
P1.11.2.7	Vibration damper for 19x3.67 20SA earthwire		span	12		
P1.11.2.8	Suspension set for 19x3.67 20SA earthwire		each	8		
P1.11.2.9	Tension set for 19x3.67 20SA earthwire		each	8		
P1.11.2.10	Vibration Damper for 19x3.67 20SA Earthwire equivalent OPGW		span	12		
P1.11.2.11	19x3.67 20SA Earthwire equivalent OPGW suspension set, complete assembly		each	8		
P1.11.2.12	19x3.67 20SA Earthwire equivalent OPGW tension set, complete assembly		each	8		
P1.12	Supply of Tower Paint, Warning spheres					
p1.12.1	Painting of tower having height more than 45meter in accordance with the requirements of the Technical Specification		per tower	25		
P1.12.2	Painting of tower (Reflecting Paint) upto 3 meter in submerge area in accordance with the requirements of the Technical Specification		per tower	20		
P1.12.3	Aircraft warning spheres for ACSR "Dorking" earthwire-Overland		each	160		
P1.12.4	Aircraft warning spheres for ACSR Dorking earthwire equivalent OPGW-overland		each	160		
P1.12.5	Aircraft warning spheres for 19x3.67 20SA earthwire-River Crossing Portion		each	53		
P1.12.6	Aircraft warning spheres for 19x3.67 20SA earthwire equivalent OPGW -River Crossing Portion		each	53		
P1.13	Supply of phase conductor, earthwire and OPGW					
P1.13.1	Overland Portion					
P1.13.1.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	176		
	b) Necessary midspan joints and repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	176		
P1.13.1.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	176		
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	176		
P1.13.1.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	176		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P1.13.2	River Crossing Portion					
P1.13.2.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	2.296		
	b) Necessary repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	2.296		
P1.13.2.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	2.296		
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	2.296		
P1.13.2.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	2.296		
S.P1	SPARES					
S.P1.1	Towers					
	400kV double circuit towers complete with all stubs, nuts, bolts, phase conductor and earthwire swivels /shackles, step bolts, access, ladders, tower notice and identification plates, ACDs etc.					
S.P1.1.1	Tower type 4DL E9.0		each	17		
S.P1.1.2	Tower type 4D1 E12.0		each	2		
S.P1.1.3	Tower type 4D25 E9.0		each	2		
S.P1.1.4	Tower type 4D45 E9.0		each	2		
S.P1.1.5	Tower type 4DT60 E9.0		each	1		
S.P1.1.6	Galvanized tower steel					
(a)	Fabricated		ton	50		
(b)	Non-fabricated		ton	50		
S.P1.2	Insulator and Fittings					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn. Arcing ring etc					
	Overland Portion					
S.P1.2.1	210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	100		
S.P1.2.2	210kN jumper suspension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	25		
S.P1.2.3	400kN twin tension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	41		
	River Crossing Portion					
S.P1.2.4	300kN tripple suspension Insulators set for quad "ACCC ULS 724/71 DHAKA" - Complete Assembly		set	3		
S.P1.2.5	400kN tripple tension set for quad "ACCC ULS 724/71 DHAKA" - Complete Assembly		set	3		
S.P1.3	Phase conductor, Earthwire, OPGW & Fittings					
	Overland Portion					
S.P1.3.1	Phase conductor Quad Bundle ACSR Finch		km	19		
S.P1.3.2	Midspan Joint for Quad Bundle ACSR Finch Conductor		each	5		
S.P1.3.3	Repair sleeve for Quad Bundle ACSR Finch Conductor		each	2		
S.P1.3.4	Spacer Damper for Quad Bundle ACSR Finch Conductor		each	51		
S.P1.3.5	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	6		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
S.P1.3.6	Earthwire ACSR "Dorking"		km	8		
S.P1.3.7	Midspan Joint for ACSR "Dorking" earthwire		each	3		
S.P1.3.8	Suspension set for ACSR "Dorking" earthwire		each	17		
S.P1.3.9	Tension set for ACSR "Dorking" earthwire		each	7		
S.P1.3.10	Vibration damper for ACSR "Dorking" earthwire		each	22		
S.P1.3.11	ACSR Dorking Equivalent OPGW		km	8		
S.P1.3.12	Suspension set for ACSR Dorking Equivalent OPGW		each	17		
S.P1.3.13	Tension set for ACSR Dorking Equivalent OPGW		each	7		
S.P1.3.14	Vibration damper for ACSR Dorking Equivalent OPGW		each	22		
River Crossing Portion						
S.P1.3.15	River Crossing Phase conductor "Quad Bundle ACSR Finch"		km	1.6		
S.P1.3.16	Repair sleeve for Quad Bundle ACSR Finch Conductor - River Crossing		each	1.6		
S.P1.3.17	Spacer Damper for Quad Bundle ACSR Finch Conductor		each	15		
S.P1.3.18	Vibration Damper for Quad Bundle ACSR Finch Conductor		each	29		
S.P1.3.19	ACSR "Dorking" earthwire		km	1.6		
S.P1.3.20	Suspension set for ACSR "Dorking" earthwire		each	1		
S.P1.3.21	Tension set for ACSR "Dorking" earthwire		each	1		
S.P1.3.22	Vibration damper for ACSR "Dorking" earthwire		each	1		
S.P1.3.23	ACSR "Dorking" Earthwire Equivalent OPGW		km	1.6		
S.P1.3.24	Suspension set for ACSR "Dorking" Earthwire Equivalent OPGW		each	1		
S.P1.3.25	Tension set for ACSR "Dorking" Earthwire Equivalent OPGW		each	1		
S.P1.3.26	Vibration damper for ACSR "Dorking" Earthwire Equivalent OPGW		each	1		
S.P1.4	Temporary earthing equipment		each	1		
S.P1.5	Elcometer		each	1		
S.P1.6	Motorised jointing compressor for conductor complete with dies suitable for conductors & earthwires to be used for this Contract		each	1		
TOTAL (Grand Summary)						

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are**Country of Origin Declaration Form**

Item	Description	Code	Country



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P2	Towers					
	Supply of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.					
	Overland Portion					
P2.1	Tower type 4DL					
P2.1.1	Tower type 4DL Standard		each	54		
P2.1.2	Tower type 4DL E1.5		each	18		
P2.1.3	Tower type 4DL E3		each	45		
P2.1.4	Tower type 4DL E4.5		each	18		
P2.1.5	Tower type 4DL E6		each	18		
P2.1.6	Tower type 4DL E9		each	27		
P2.2	Tower type 4D1					
P2.2.1	Tower type 4D1 Standard		each	1		
P2.2.2	Tower type 4D1 E1.5		each	1		
P2.2.3	Tower type 4D1 E3		each	1		
P2.2.4	Tower type 4D1 E4.5		each	2		
P2.2.5	Tower type 4D1 E6		each	2		
P2.2.6	Tower type 4D1 E9		each	2		
P2.2.7	Tower type 4D1 E12		each	2		
P2.2.8	Tower type 4D1 E15		each	2		
P2.2.9	Tower type 4D1 E20		each	2		
P2.2.10	Tower type 4D1 E25		each	2		
P2.2.11	Tower type 4D1 E30		each	2		
P2.2.12	Tower type 4D1 E40		each	2		
P2.3	Tower type 4D25 (4DXP)					
P2.3.1	Tower type 4D25 Standard		each	2		
P2.3.2	Tower type 4D25 E1.5		each	1		
P2.3.3	Tower type 4D25 E3		each	2		
P2.3.4	Tower type 4D25 E4.5		each	2		
P2.3.5	Tower type 4D25 E6		each	2		
P2.3.6	Tower type 4D25 E9		each	2		
P2.3.7	Tower type 4D25(4DXP) E6		each	2		
P2.4	Tower Type 4D45					
P2.4.1	Tower type 4D45 Standard		each	3		
P2.4.2	Tower type 4D45 E1.5		each	2		
P2.4.3	Tower type 4D45 E3		each	1		
P2.4.4	Tower type 4D45 E4.5		each	1		
P2.4.5	Tower type 4D45 E6		each	1		
P2.4.6	Tower type 4D45 E9		each	2		
P2.5	Tower Type 4DT6					
P2.5.1	Tower type 4DT6 Standard		each	1		
P2.5.2	Tower type 4DT6 E1.5		each	1		
P2.5.3	Tower type 4DT6 E3		each	1		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P2.5.4	Tower type 4DT6 E4.5		each	1		
P2.5.5	Tower type 4DT6 E6		each	1		
P2.5.6	Tower type 4DT6 E9		each	2		
P2.6	Auxiliary Crossarm for tower					
P2.6.1	Auxiliary crossarm for tower type 4DT6		per set of three	4		
P2.7	Air Craft Obstruction Lights					
P2.7.1	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	14		
P2.8	Tower Test					
P2.8.1	Tower load test to prove compliance with specification. Payment for successful test only. Tested Tower to be supplied to the Employer's store as per technical specification.					
(a)	Contractor to fill up, if required					
(b)	Contractor to fill up, if required					
(c)	Contractor to fill up, if required					
(d)	Contractor to fill up, if required					
P2.9	Supply of insulator and fittings:					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn, Arcing ring etc					
P2.9.1	400kV Overland Portion					
P2.9.1.1	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Suspension) - disc only		set	1,080		
	b) 210kN twin suspension Insulators Fittings set for Quad Bundle ACSR Finch Conductor (Suspension) - hardware fittings only		set	1,080		
P2.9.1.2	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Heavy Suspension) - disc only		set	138		
	b) 210kN twin suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	138		
P2.9.1.3	a) 210kN jumper suspension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	141		
	b) 210kN jumper suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	141		
P2.9.1.4	a) 400kN twin tension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	348		
	b) 400kN twin tension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	348		
P2.9.1.5	a) 210kN single upright low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single upright low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P2.9.1.6	a) 210kN single inverted low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single inverted low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		
P2.9.1.7	Spacer damper for Quad Bundle ACSR Finch Conductor		span-phase	231		
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasesxN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.					
P2.9.1.8	Vibration Damper for Quad Bundle ACSR Finch Conductor		span	231		
P2.9.1.9	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	1320		
P2.9.1.10	Vibration damper for ACSR "Dorking" earthwire		span	423		
P2.9.1.11	Suspension set for ACSR "Dorking" earthwire		each	203		
P2.9.1.12	Tension set for ACSR "Dorking" earthwire		each	58		
P2.9.1.13	Vibration Damper for ACSR Dorking earthwire equivalent OPGW		span	231		
P2.9.1.14	Suspension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	203		
P2.9.1.15	Tension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	58		
P2.9.1.16	Counterweights for 210kN suspension insulator sets complete with yoke plate attachment bolts to be used for 4D1 towers:					
(a)	- 40kg set		each	5		
(b)	- 80kg set		each	5		
(c)	- 120kg set		each	3		
P2.10	Supply of Tower Paint, Warning spheres					
P2.10.1	Painting of tower having height more than 45meter in accordance with the requirements of the Technical Specification		per tower	25		
P2.10.2	Painting of tower (Reflecting Paint) upto 3 meter in submerge area in accordance with the requirements of the Technical Specification		per tower	20		
P2.10.3	Aircraft warning spheres for ACSR "Dorking" earthwire-Overland		each	100		
P2.10.4	Aircraft warning spheres for ACSR Dorking earthwire equivalent OPGW-overland		each	100		
P2.11	Supply of phase conductor, earthwire and OPGW					
P2.11.1	Overland Portion					
P2.11.1.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	73.291		
	b) Necessary midspan joints and repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	73.291		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P2.11.1.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	73.291		
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	73.291		
P2.11.1.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	73.291		
S.P2	SPARES					
S.P2.1	Towers					
	400kV double circuit towers complete with all stubs, nuts, bolts, phase conductor and earthwire swivels /shackles, step bolts, access, ladders, tower notice and identification plates, ACDs etc.					
S.P2.1.1	Tower type 4DL E9.0		each	17		
S.P2.1.2	Tower type 4D1 E12.0		each	2		
S.P2.1.3	Tower type 4D25 E9.0		each	2		
S.P2.1.4	Tower type 4D45 E9.0		each	2		
S.P2.1.5	Tower type 4DT60 E9.0		each	1		
S.P2.1.6	Galvanized tower steel					
(a)	Fabricated		ton	50		
(b)	Non-fabricated		ton	50		
S.P2.2	Insulator and Fittings					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn. Arcing ring etc					
	Overland Portion					
S.P2.2.1	210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	100		
S.P2.2.2	210kN jumper suspension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	25		
S.P2.2.3	400kN twin tension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	41		
S.P2.3	Phase conductor, Earthwire, OPGW & Fittings					
	Overland Portion					
S.P2.3.1	Phase conductor Quad Bundle ACSR Finch		km	19		
S.P2.3.2	Midspan Joint for Quad Bundle ACSR Finch Conductor		each	5		
S.P2.3.3	Repair sleeve for Quad Bundle ACSR Finch Conductor		each	2		
S.P2.3.4	Spacer Damper for Quad Bundle ACSR Finch Conductor		each	51		
S.P2.3.5	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	6		
S.P2.3.6	Earthwire ACSR "Dorking"		km	8		
S.P2.3.7	Midspan Joint for ACSR "Dorking" earthwire		each	3		
S.P2.3.8	Suspension set for ACSR "Dorking" earthwire		each	17		
S.P2.3.9	Tension set for ACSR "Dorking" earthwire		each	7		
S.P2.3.10	Vibration damper for ACSR "Dorking" earthwire		each	22		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
S.P2.3.11	ACSR Dorking Equivalent OPGW		km	8		
S.P2.3.12	Suspension set for ACSR Dorking Equivalent OPGW		each	17		
S.P2.3.13	Tension set for ACSR Dorking Equivalent OPGW		each	7		
S.P2.3.14	Vibration damper for ACSR Dorking Equivalent OPGW		each	22		
S.P2.4	Temporary earthing equipment		each	1		
S.P2.5	Elcometer		each	1		
S.P2.6	Motorised jointing compressor for conductor complete with dies suitable for conductors & earthwires to be used for this Contract		each	1		
TOTAL (Grand Summary)						
			Name of Bidder			
			Signature of Bidder			

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are

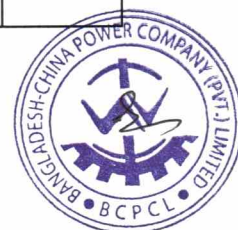
Country of Origin Declaration Form

Item	Description	Code	Country



SECTION A: Transmission Line Portion - Padma River Crossing Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P3	Supply of Padma River Crossing 400 kV double circuit towers, complete with all stubs, nuts, bolts, locking nuts, washers, phase conductors and earthwire, swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing, etc.					
P3.1	Tower Type 4DR					
P3.1.1	Tower Type 4DR1 Standard		each	9		
P3.2	Tower Type 4DAX					
P3.2.1	Tower Type 4DAX Standard		each	2		
P3.3	Phase conductor, earthwire and OPGW cable, complete with repair sleeves and joints for Padma River Crossing					
P3.3.1	Conductor "ACCC 724/71 DHAKA" (double circuit line, both circuits erected, four conductors per phase) [3]		Route km3	6.777		
P3.3.2	One optical fibre groundwire, 48 fibres OPGW, mechanically compatible with 19 x 3.67 20 SA earthwire equiv.		Route km3	6.777		
P3.3.3	One earth shield wire 19 X 3 67 - 20SA Type		Route km3	6.777		
P3.4	Insulator strings, with associated suspension and tension clamps for quadruple "ACCC 724/71 DHAKA" conductor for Padma River Crossing					
P3.4.1	a) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - disc only		set	54		
	b) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - fittings only		set	54		
P3.4.2	a) Triple tension string, each string having 400kN, total 1200kN - disc only		set	12		
	b) Triple tension string, each string having 400kN, total 1200kN - fittings only		set	12		
P3.5	Earthwire sets, complete with all accessories for Padma River Crossing					
P3.5.1	Suspension set		set	9		
P3.5.2	Tension set		set	2		
P3.6	OPGW sets, complete with all accessories, incl. armour rods and earth bounds for Padma River Crossing					
P3.6.1	Suspension set (including all fittings and accessories for surplus and to guide the OPGW to the joint box)		set	9		
P3.6.2	Tension set (including all fittings and accessories for surplus and to guide the OPGW to the joint box)		set	2		
P3.7	Dampers for PADMA River Crossing					
P3.7.1	Vibration damper for phase conductor		per span	10		
P3.7.2	Spacer damper for phase conductor		per span	10		
P3.7.3	Vibration damper for earthwire		per span	10		
P3.7.4	Vibration damper for OPGW		per span	10		
P3.8	Aerial Markers					
P3.8.1	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	9		
P3.8.2	Bird diverters		pcs.	11		
P3.8.3	Bird guards, one bird guard per each crossarm applied on intermediate towers		pcs.	54		
P3.8.4	Aircraft warning spheres		pcs.	240		
P3.8.5	Painting of 60 meter and over tower in accordance with the requirements of the Technical Specification		per tower	9		



SECTION A: Transmission Line Portion - Padma River Crossing Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P3.9	Mandatory Spare Parts and Tools for Padma River Crossing					
P3.9.1	Conductor "ACCC 724/71 DHAKA"		km	11		
P3.9.2	Optical fibre ground wire, 48 fibres OPGW, mechanically compatible with 19 x 3.67 20 SA earthwire equivalent		km	5		
P3.9.3	One earth shield wire 19 X 3 67 - 20SA type		km	5		
P3.9.4	a) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - disc only		set	12		
	b) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - fittings only		set	12		
P3.9.5	a) Triple tension string, each string having 400kN, total 1200kN - disc only		set	6		
	b) Triple tension string, each string having 400kN, total 1200kN - fittings only		set	6		
P3.9.6	Suspension set Suitable for earthwire 19 X 3 67 - 20SA type		set	1		
P3.9.7	Tension set Suitable for 19 X 3 67 - 20SA type		set	1		
P3.9.8	OPGW 48 fibres suspension set		set	2		
P3.9.9	OPGW 48 fibres tension set		set	2		
P3.9.10	OPGW junction box		set	2		
P3.9.11	Vibration damper for phase conductor "ACCC 724/71 DHAKA"		each	16		
P3.9.12	Vibration damper for earth shield wire earthwire 19 X 3 67 - 20SA type		each	10		
P3.9.13	Vibration damper for OPGW		each	10		
P3.9.14	Repair sleeve for conductor - "ACCC 724/71 DHAKA"		pcs	10		
P3.9.15	Repair sleeve for earth shield wire 19 X 3 67 - 20SA type		pcs	1		
P3.9.16	Midspan joints for conductor "ACCC 724/71 DHAKA"		pcs	10		
P3.9.17	Midspan joints for earth shield wire 19 X 3 67 - 20SA type		pcs	5		
P3.9.18	Bird diverters		pcs	1		
P3.9.19	Bird guard		pcs	1		
P3.9.20	Aircraft warning markers		pcs	1		
P3.9.21	Terminal ground resistance tester (tools)		pcs	1		
P3.9.22	Fusion splicer OPGW (tools)		pcs	1		
P3.9.23	Set of temporary earthing equipment, as described in Annex 16-1		set	1		
P3.9.24	Elcometer for measuring galvanization thickness		pcs	1		
TOTAL (Grand Summary)						

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are.**Country of Origin Declaration Form**

Item	Description	Code	Country



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P1	Towers					
	Supply of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.					
	Overland Portion					
P1.1	Tower type 4DL					
P1.1.1	Tower type 4DL Standard		each	21		
P1.1.2	Tower type 4DL E1.5		each	15		
P1.1.3	Tower type 4DL E3		each	25		
P1.1.4	Tower type 4DL E4.5		each	50		
P1.1.5	Tower type 4DL E6		each	80		
P1.1.6	Tower type 4DL E9		each	140		
P1.2	Tower type 4D1					
P1.2.1	Tower type 4D1 Standard		each	1		
P1.2.2	Tower type 4D1 E1.5		each	1		
P1.2.3	Tower type 4D1 E3		each	1		
P1.2.4	Tower type 4D1 E4.5		each	1		
P1.2.5	Tower type 4D1 E6		each	2		
P1.2.6	Tower type 4D1 E9		each	1		
P1.2.7	Tower type 4D1 E12		each	1		
P1.2.8	Tower type 4D1 E15		each	4		
P1.2.9	Tower type 4D1 E20		each	4		
P1.2.10	Tower type 4D1 E25		each	3		
P1.2.11	Tower type 4D1 E30		each	3		
P1.2.12	Tower type 4D1 E40		each	2		
P1.3	Tower type 4D25 (4DXP)					
P1.3.1	Tower type 4D25 Standard		each	1		
P1.3.2	Tower type 4D25 E1.5		each	1		
P1.3.3	Tower type 4D25 E3		each	7		
P1.3.4	Tower type 4D25 E4.5		each	1		
P1.3.5	Tower type 4D25 E6		each	6		
P1.3.6	Tower type 4D25 E9		each	12		
P1.3.7	Tower type 4D25(4DXP) E6		each	2		
P1.4	Tower Type 4D45					
P1.4.1	Tower type 4D45 Standard		each	1		
P1.4.2	Tower type 4D45 E1.5		each	1		
P1.4.3	Tower type 4D45 E3		each	4		
P1.4.4	Tower type 4D45 E4.5		each	1		
P1.4.5	Tower type 4D45 E6		each	14		
P1.4.6	Tower type 4D45 E9		each	6		
P1.5	Tower Type 4DT6					
P1.5.1	Tower type 4DT6 Standard		each	1		
P1.5.2	Tower type 4DT6 E1.5		each	1		
P1.5.3	Tower type 4DT6 E3		each	1		
P1.5.4	Tower type 4DT6 E4.5		each	1		
P1.5.5	Tower type 4DT6 E6		each	1		
P1.5.6	Tower type 4DT6 E9		each	3		
	River Crossing Portion (Item P1.6 and P1.7)					



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P1.6	Tower Type 4DR					
P1.6.1	Tower Type 4DR1 Standard		each	2		
P1.6.2	Tower Type 4DR1 E10		each	2		
P1.6.3	Tower Type 4DR1 E30		each	2		
P1.6.4	Tower Type 4DR2		each	2		
P1.7	Tower Type 4DAX					
P1.7.1	Tower Type 4DAX Standard		each	8		
P1.8	Auxiliary Crossarm for tower					
P1.8.1	Auxiliary crossarm for tower type 4DT6		per set of three	2		
P1.9	Air Craft Obstruction Lights					
P1.9.1	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	14		
P1.10	Tower Test					
P1.10.1	Tower load test to prove compliance with specification. Payment for successful test only. Tested Tower to be supplied to the Employer's store as per technical specification.					
(a)	Contractor to fill up, if required					
(b)	Contractor to fill up, if required					
(c)	Contractor to fill up, if required					
(d)	Contractor to fill up, if required					
P1.11	Supply of insulator and fittings:					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn, Arcing ring etc					
P1.11.1	400kV Overland Portion					
P1.11.1.1	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Suspension) - disc only		set	1,986		
	b) 210kN twin suspension Insulators Fittings set for Quad Bundle ACSR Finch Conductor (Suspension) - hardware fittings only		set	1,986		
P1.11.1.2	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Heavy Suspension) - disc only		set	144		
	b) 210kN twin suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	144		
P1.11.1.3	a) 210kN jumper suspension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	486		
	b) 210kN jumper suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	486		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P1.11.1.4	a) 400kN twin tension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	816		
	b) 400kN twin tension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	816		
P1.11.1.5	a) 210kN single upright low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single upright low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		
P1.11.1.6	a) 210kN single inverted low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single inverted low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		
P1.11.1.7	Spacer damper for Quad Bundle ACSR Finch Conductor		span-phase	2,538		
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasexN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.					
P1.11.1.8	Vibration Damper for Quad Bundle ACSR Finch Conductor		span	423		
P1.11.1.9	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	1182		
P1.11.1.10	Vibration damper for ACSR "Dorking" earthwire		span	423		
P1.11.1.11	Suspension set for ACSR "Dorking" earthwire		each	331		
P1.11.1.12	Tension set for ACSR "Dorking" earthwire		each	138		
P1.11.1.13	Vibration Damper for ACSR Dorking earthwire equivalent OPGW		span	423		
P1.11.1.14	Suspension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	331		
P1.11.1.15	Tension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	138		
P1.11.1.16	Counterweights for 210kN suspension insulator sets complete with yoke plate attachment bolts to be used for 4D1 towers:					
(a)	- 40kg set		each	8		
(b)	- 80kg set		each	6		
(c)	- 120kg set		each	10		
P1.11.2	400kV River Crossing Portion					
P1.11.2.1	a) 300kN tripple suspension Insulators set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - disc only		set	36		
	b) 300kN tripple suspension Insulators Fittings set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - hardware fittings only		set	36		
P1.11.2.2	a) 300kN tripple suspension Insulators set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - disc only		set	12		
	b) 300kN tripple suspension Insulators Fittings set with double AGS Clamp for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - hardware fittings only		set	12		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P1.11.2.3	a) 400kN tripple tension Insulators Set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor - disc only		set	48		
	b) 400kN tripple tension Insulators Fittings Set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor - hardware fittings only		set	48		
P1.11.2.4	Spacer damper for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		span-phase	72		
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasesN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.					
P1.11.2.5	Vibration Damper for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		span	12		
P1.11.2.6	Jumper Spacer for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		each	144		
P1.11.2.7	Vibration damper for 19x3.67 20SA earthwire		span	12		
P1.11.2.8	Suspension set for 19x3.67 20SA earthwire		each	8		
P1.11.2.9	Tension set for 19x3.67 20SA earthwire		each	8		
P1.11.2.10	Vibration Damper for 19x3.67 20SA Earthwire equivalent OPGW		span	12		
P1.11.2.11	19x3.67 20SA Earthwire equivalent OPGW suspension set, complete assembly		each	8		
P1.11.2.12	19x3.67 20SA Earthwire equivalent OPGW tension set, complete assembly		each	8		
P1.12	Supply of Tower Paint, Warning spheres					
p1.12.1	Painting of tower having height more than 45meter in accordance with the requirements of the Technical Specification		per tower	25		
P1.12.2	Painting of tower (Reflecting Paint) upto 3 meter in submerge area in accordance with the requirements of the Technical Specification		per tower	20		
P1.12.3	Aircraft warning spheres for ACSR "Dorking" earthwire-Overland		each	160		
P1.12.4	Aircraft warning spheres for ACSR Dorking earthwire equivalent OPGW-overland		each	160		
P1.12.5	Aircraft warning spheres for 19x3.67 20SA earthwire-River Crossing Portion		each	53		
P1.12.6	Aircraft warning spheres for 19x3.67 20SA earthwire equivalent OPGW -River Crossing Portion		each	53		
P1.13	Supply of phase conductor, earthwire and OPGW					
P1.13.1	Overland Portion					
P1.13.1.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	176		
	b) Necessary midspan joints and repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	176		
P1.13.1.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	176		
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	176		
P1.13.1.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	176		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P1.13.2	River Crossing Portion					
P1.13.2.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	2.296		
	b) Necessary repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	2.296		
P1.13.2.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	2.296		
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	2.296		
P1.13.2.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	2.296		
S.P1	SPARES					
S.P1.1	Towers					
	400kV double circuit towers complete with all stubs, nuts, bolts, phase conductor and earthwire swivels /shackles, step bolts, access, ladders, tower notice and identification plates, ACDs etc.					
S.P1.1.1	Tower type 4DL E9.0		each	17		
S.P1.1.2	Tower type 4D1 E12.0		each	2		
S.P1.1.3	Tower type 4D25 E9.0		each	2		
S.P1.1.4	Tower type 4D45 E9.0		each	2		
S.P1.1.5	Tower type 4DT60 E9.0		each	1		
S.P1.1.6	Galvanized tower steel					
(a)	Fabricated		ton	50		
(b)	Non-fabricated		ton	50		
S.P1.2	Insulator and Fittings					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn. Arcing ring etc					
	Overland Portion					
S.P1.2.1	210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	100		
S.P1.2.2	210kN jumper suspension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	25		
S.P1.2.3	400kN twin tension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	41		
	River Crossing Portion					
S.P1.2.4	300kN tripple suspension Insulators set for quad "ACCC ULS 724/71 DHAKA" - Complete Assembly		set	3		
S.P1.2.5	400kN tripple tension set for quad "ACCC ULS 724/71 DHAKA" - Complete Assembly		set	3		
S.P1.3	Phase conductor, Earthwire, OPGW & Fittings					
	Overland Portion					
S.P1.3.1	Phase conductor Quad Bundle ACSR Finch		km	19		
S.P1.3.2	Midspan Joint for Quad Bundle ACSR Finch Conductor		each	5		
S.P1.3.3	Repair sleeve for Quad Bundle ACSR Finch Conductor		each	2		
S.P1.3.4	Spacer Damper for Quad Bundle ACSR Finch Conductor		each	51		
S.P1.3.5	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	6		



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
S.P1.3.6	Earthwire ACSR "Dorking"		km	8		
S.P1.3.7	Midspan Joint for ACSR "Dorking" earthwire		each	3		
S.P1.3.8	Suspension set for ACSR "Dorking" earthwire		each	17		
S.P1.3.9	Tension set for ACSR "Dorking" earthwire		each	7		
S.P1.3.10	Vibration damper for ACSR "Dorking" earthwire		each	22		
S.P1.3.11	ACSR Dorking Equivalent OPGW		km	8		
S.P1.3.12	Suspension set for ACSR Dorking Equivalent OPGW		each	17		
S.P1.3.13	Tension set for ACSR Dorking Equivalent OPGW		each	7		
S.P1.3.14	Vibration damper for ACSR Dorking Equivalent OPGW		each	22		
River Crossing Portion						
S.P1.3.15	River Crossing Phase conductor "Quad Bundle ACSR Finch"		km	1.6		
S.P1.3.16	Repair sleeve for Quad Bundle ACSR Finch Conductor - River Crossing		each	1.6		
S.P1.3.17	Spacer Damper for Quad Bundle ACSR Finch Conductor		each	15		
S.P1.3.18	Vibration Damper for Quad Bundle ACSR Finch Conductor		each	29		
S.P1.3.19	ACSR "Dorking" earthwire		km	1.6		
S.P1.3.20	Suspension set for ACSR "Dorking" earthwire		each	1		
S.P1.3.21	Tension set for ACSR "Dorking" earthwire		each	1		
S.P1.3.22	Vibration damper for ACSR "Dorking" earthwire		each	1		
S.P1.3.23	ACSR "Dorking" Earthwire Equivalent OPGW		km	1.6		
S.P1.3.24	Suspension set for ACSR "Dorking" Earthwire Equivalent OPGW		each	1		
S.P1.3.25	Tension set for ACSR "Dorking" Earthwire Equivalent OPGW		each	1		
S.P1.3.26	Vibration damper for ACSR "Dorking" Earthwire Equivalent OPGW		each	1		
S.P1.4	Temporary earthing equipment		each	1		
S.P1.5	Elcometer		each	1		
S.P1.6	Motorised jointing compressor for conductor complete with dies suitable for conductors & earthwires to be used for this Contract		each	1		
TOTAL (Grand Summary)						

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are**Country of Origin Declaration Form**

Item	Description	Code	Country



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P2	Towers					
	Supply of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.					
	Overland Portion					
P2.1	Tower type 4DL					
P2.1.1	Tower type 4DL Standard		each	54		
P2.1.2	Tower type 4DL E1.5		each	18		
P2.1.3	Tower type 4DL E3		each	45		
P2.1.4	Tower type 4DL E4.5		each	18		
P2.1.5	Tower type 4DL E6		each	18		
P2.1.6	Tower type 4DL E9		each	27		
P2.2	Tower type 4D1					
P2.2.1	Tower type 4D1 Standard		each	1		
P2.2.2	Tower type 4D1 E1.5		each	1		
P2.2.3	Tower type 4D1 E3		each	1		
P2.2.4	Tower type 4D1 E4.5		each	2		
P2.2.5	Tower type 4D1 E6		each	2		
P2.2.6	Tower type 4D1 E9		each	2		
P2.2.7	Tower type 4D1 E12		each	2		
P2.2.8	Tower type 4D1 E15		each	2		
P2.2.9	Tower type 4D1 E20		each	2		
P2.2.10	Tower type 4D1 E25		each	2		
P2.2.11	Tower type 4D1 E30		each	2		
P2.2.12	Tower type 4D1 E40		each	2		
P2.3	Tower type 4D25 (4DXP)					
P2.3.1	Tower type 4D25 Standard		each	2		
P2.3.2	Tower type 4D25 E1.5		each	1		
P2.3.3	Tower type 4D25 E3		each	2		
P2.3.4	Tower type 4D25 E4.5		each	2		
P2.3.5	Tower type 4D25 E6		each	2		
P2.3.6	Tower type 4D25 E9		each	2		
P2.3.7	Tower type 4D25(4DXP) E6		each	2		
P2.4	Tower Type 4D45					
P2.4.1	Tower type 4D45 Standard		each	3		
P2.4.2	Tower type 4D45 E1.5		each	2		
P2.4.3	Tower type 4D45 E3		each	1		
P2.4.4	Tower type 4D45 E4.5		each	1		
P2.4.5	Tower type 4D45 E6		each	1		
P2.4.6	Tower type 4D45 E9		each	2		
P2.5	Tower Type 4DT6					
P2.5.1	Tower type 4DT6 Standard		each	1		
P2.5.2	Tower type 4DT6 E1.5		each	1		
P2.5.3	Tower type 4DT6 E3		each	1		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P2.5.4	Tower type 4DT6 E4.5		each	1		
P2.5.5	Tower type 4DT6 E6		each	1		
P2.5.6	Tower type 4DT6 E9		each	2		
P2.6	Auxiliary Crossarm for tower					
P2.6.1	Auxiliary crossarm for tower type 4DT6		per set of three	4		
P2.7	Air Craft Obstruction Lights					
P2.7.1	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	14		
P2.8	Tower Test					
P2.8.1	Tower load test to prove compliance with specification. Payment for successful test only. Tested Tower to be supplied to the Employer's store as per technical specification.					
(a)	Contractor to fill up, if required					
(b)	Contractor to fill up, if required					
(c)	Contractor to fill up, if required					
(d)	Contractor to fill up, if required					
P2.9	Supply of insulator and fittings:					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn, Arcing ring etc					
P2.9.1	400kV Overland Portion					
P2.9.1.1	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Suspension) - disc only		set	1,080		
	b) 210kN twin suspension Insulators Fittings set for Quad Bundle ACSR Finch Conductor (Suspension) - hardware fittings only		set	1,080		
P2.9.1.2	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Heavy Suspension) - disc only		set	138		
	b) 210kN twin suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	138		
P2.9.1.3	a) 210kN jumper suspension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	141		
	b) 210kN jumper suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	141		
P2.9.1.4	a) 400kN twin tension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	348		
	b) 400kN twin tension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	348		
P2.9.1.5	a) 210kN single upright low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single upright low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		



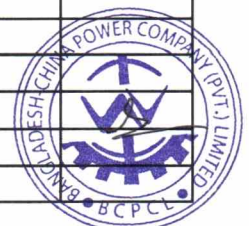
SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P2.9.1.6	a) 210kN single inverted low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12		
	b) 210kN single inverted low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12		
P2.9.1.7	Spacer damper for Quad Bundle ACSR Finch Conductor		span-phase	231		
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phase x N', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.					
P2.9.1.8	Vibration Damper for Quad Bundle ACSR Finch Conductor		span	231		
P2.9.1.9	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	1320		
P2.9.1.10	Vibration damper for ACSR "Dorking" earthwire		span	423		
P2.9.1.11	Suspension set for ACSR "Dorking" earthwire		each	203		
P2.9.1.12	Tension set for ACSR "Dorking" earthwire		each	58		
P2.9.1.13	Vibration Damper for ACSR Dorking earthwire equivalent OPGW		span	231		
P2.9.1.14	Suspension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	203		
P2.9.1.15	Tension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	58		
P2.9.1.16	Counterweights for 210kN suspension insulator sets complete with yoke plate attachment bolts to be used for 4D1 towers:					
(a)	- 40kg set		each	5		
(b)	- 80kg set		each	5		
(c)	- 120kg set		each	3		
P2.10	Supply of Tower Paint, Warning spheres					
P2.10.1	Painting of tower having height more than 45meter in accordance with the requirements of the Technical Specification		per tower	25		
P2.10.2	Painting of tower (Reflecting Paint) upto 3 meter in submerge area in accordance with the requirements of the Technical Specification		per tower	20		
P2.10.3	Aircraft warning spheres for ACSR "Dorking" earthwire-Overland		each	100		
P2.10.4	Aircraft warning spheres for ACSR Dorking earthwire equivalent OPGW-overland		each	100		
P2.11	Supply of phase conductor, earthwire and OPGW					
P2.11.1	Overland Portion					
P2.11.1.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	73.291		
	b) Necessary midspan joints and repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	73.291		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P2.11.1.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	73.291		
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	73.291		
P2.11.1.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	73.291		
S.P2	SPARES					
S.P2.1	Towers					
	400kV double circuit towers complete with all stubs, nuts, bolts, phase conductor and earthwire swivels /shackles, step bolts, access, ladders, tower notice and identification plates, ACDs etc.					
S.P2.1.1	Tower type 4DL E9.0		each	17		
S.P2.1.2	Tower type 4D1 E12.0		each	2		
S.P2.1.3	Tower type 4D25 E9.0		each	2		
S.P2.1.4	Tower type 4D45 E9.0		each	2		
S.P2.1.5	Tower type 4DT60 E9.0		each	1		
S.P2.1.6	Galvanized tower steel					
(a)	Fabricated		ton	50		
(b)	Non-fabricated		ton	50		
S.P2.2	Insulator and Fittings					
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn. Arcing ring etc					
	Overland Portion					
S.P2.2.1	210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	100		
S.P2.2.2	210kN jumper suspension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	25		
S.P2.2.3	400kN twin tension set for Quad Bundle ACSR Finch Conductor - Complete Assembly		set	41		
S.P2.3	Phase conductor, Earthwire, OPGW & Fittings					
	Overland Portion					
S.P2.3.1	Phase conductor Quad Bundle ACSR Finch		km	19		
S.P2.3.2	Midspan Joint for Quad Bundle ACSR Finch Conductor		each	5		
S.P2.3.3	Repair sleeve for Quad Bundle ACSR Finch Conductor		each	2		
S.P2.3.4	Spacer Damper for Quad Bundle ACSR Finch Conductor		each	51		
S.P2.3.5	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	6		
S.P2.3.6	Earthwire ACSR "Dorking"		km	8		
S.P2.3.7	Midspan Joint for ACSR "Dorking" earthwire		each	3		
S.P2.3.8	Suspension set for ACSR "Dorking" earthwire		each	17		
S.P2.3.9	Tension set for ACSR "Dorking" earthwire		each	7		
S.P2.3.10	Vibration damper for ACSR "Dorking" earthwire		each	22		



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
S.P2.3.11	ACSR Dorking Equivalent OPGW		km	8		
S.P2.3.12	Suspension set for ACSR Dorking Equivalent OPGW		each	17		
S.P2.3.13	Tension set for ACSR Dorking Equivalent OPGW		each	7		
S.P2.3.14	Vibration damper for ACSR Dorking Equivalent OPGW		each	22		
S.P2.4	Temporary earthing equipment		each	1		
S.P2.5	Elcometer		each	1		
S.P2.6	Motorised jointing compressor for conductor complete with dies suitable for conductors & earthwires to be used for this Contract		each	1		
TOTAL (Grand Summary)						
			Name of Bidder			
			Signature of Bidder			

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are

Country of Origin Declaration Form

Item	Description	Code	Country



SECTION A: Transmission Line Portion - Padma River Crossing Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P3	Supply of Padma River Crossing 400 kV double circuit towers, complete with all stubs, nuts, bolts, locking nuts, washers, phase conductors and earthwire, swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing, etc.					
P3.1	Tower Type 4DR					
P3.1.1	Tower Type 4DR1 Standard		each	9		
P3.2	Tower Type 4DAX					
P3.2.1	Tower Type 4DAX Standard		each	2		
P3.3	Phase conductor, earthwire and OPGW cable, complete with repair sleeves and joints for Padma River Crossing					
P3.3.1	Conductor "ACCC 724/71 DHAKA" (double circuit line, both circuits erected, four conductors per phase) [3]		Route km3	6.777		
P3.3.2	One optical fibre groundwire, 48 fibres OPGW, mechanically compatible with 19 x 3.67 20 SA earthwire equiv.		Route km3	6.777		
P3.3.3	One earth shield wire 19 X 3 67 - 20SA Type		Route km3	6.777		
P3.4	Insulator strings, with associated suspension and tension clamps for quadruple "ACCC 724/71 DHAKA" conductor for Padma River Crossing					
P3.4.1	a) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - disc only		set	54		
	b) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - fittings only		set	54		
P3.4.2	a) Triple tension string, each string having 400kN, total 1200kN - disc only		set	12		
	b) Triple tension string, each string having 400kN, total 1200kN - fittings only		set	12		
P3.5	Earthwire sets, complete with all accessories for Padma River Crossing					
P3.5.1	Suspension set		set	9		
P3.5.2	Tension set		set	2		
P3.6	OPGW sets, complete with all accessories, incl. armour rods and earth bounds for Padma River Crossing					
P3.6.1	Suspension set (including all fittings and accessories for surplus and to guide the OPGW to the joint box)		set	9		
P3.6.2	Tension set (including all fittings and accessories for surplus and to guide the OPGW to the joint box)		set	2		
P3.7	Dampers for PADMA River Crossing					
P3.7.1	Vibration damper for phase conductor		per span	10		
P3.7.2	Spacer damper for phase conductor		per span	10		
P3.7.3	Vibration damper for earthwire		per span	10		
P3.7.4	Vibration damper for OPGW		per span	10		
P3.8	Aerial Markers					
P3.8.1	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	9		
P3.8.2	Bird diverters		pcs.	11		
P3.8.3	Bird guards, one bird guard per each crossarm applied on intermediate towers		pcs.	54		
P3.8.4	Aircraft warning spheres		pcs.	240		
P3.8.5	Painting of 60 meter and over tower in accordance with the requirements of the Technical Specification		per tower	9		



SECTION A: Transmission Line Portion - Padma River Crossing Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P3.9	Mandatory Spare Parts and Tools for Padma River Crossing					
P3.9.1	Conductor "ACCC 724/71 DHAKA"		km	11		
P3.9.2	Optical fibre ground wire, 48 fibres OPGW, mechanically compatible with 19 x 3.67 20 SA earthwire equivalent		km	5		
P3.9.3	One earth shield wire 19 X 3 67 - 20SA type		km	5		
P3.9.4	a) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - disc only		set	12		
	b) Triple suspension string with AGS suspension clamp to hold quad ACCC, each string having 300kN, total 900kN - fittings only		set	12		
P3.9.5	a) Triple tension string, each string having 400kN, total 1200kN - disc only		set	6		
	b) Triple tension string, each string having 400kN, total 1200kN - fittings only		set	6		
P3.9.6	Suspension set Suitable for earthwire 19 X 3 67 - 20SA type		set	1		
P3.9.7	Tension set Suitable for 19 X 3 67 - 20SA type		set	1		
P3.9.8	OPGW 48 fibres suspension set		set	2		
P3.9.9	OPGW 48 fibres tension set		set	2		
P3.9.10	OPGW junction box		set	2		
P3.9.11	Vibration damper for phase conductor "ACCC 724/71 DHAKA"		each	16		
P3.9.12	Vibration damper for earth shield wire earthwire 19 X 3 67 - 20SA type		each	10		
P3.9.13	Vibration damper for OPGW		each	10		
P3.9.14	Repair sleeve for conductor - "ACCC 724/71 DHAKA"		pcs	10		
P3.9.15	Repair sleeve for earth shield wire 19 X 3 67 - 20SA type		pcs	1		
P3.9.16	Midspan joints for conductor "ACCC 724/71 DHAKA"		pcs	10		
P3.9.17	Midspan joints for earth shield wire 19 X 3 67 - 20SA type		pcs	5		
P3.9.18	Bird diverters		pcs	1		
P3.9.19	Bird guard		pcs	1		
P3.9.20	Aircraft warning markers		pcs	1		
P3.9.21	Terminal ground resistance tester (tools)		pcs	1		
P3.9.22	Fusion splicer OPGW (tools)		pcs	1		
P3.9.23	Set of temporary earthing equipment, as described in Annex 16-1		set	1		
P3.9.24	Elcometer for measuring galvanization thickness		pcs	1		
TOTAL (Grand Summary)						
			Name of Bidder			
			Signature of Bidder			

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are.**Country of Origin Declaration Form**

Item	Description	Code	Country



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 3. Design Services**

Item no.	Description	Unit	Qty.	Unit Price ¹		Total Price ¹	
				Foreign Currency Portion (in USD)	Local Currency Portion (in BDT)	Foreign (in USD)	Local (in BDT)
				(2)	(3)	4= '(1) x (2)	5= '(1)x(3)
P1.1	Line Design						
	Detailed line design including plan and profiles; conductor, earthwire and OPGW sag tension calculations; tower spotting, establishment of line schedule; Design of insulator strings, OPGW and earthwire attachments.	Lot	1				
P1.2	Tower Design						
	Design of fabrication drawings and shop drawings including body extensions, hill-side extensions, stubs, and signs as per specifications						
P1.2.1	Tower type 4DL	Lot	1				
P1.2.2	Tower type 4D1	Lot	1				
P1.2.3	Tower type 4D25 (4DXP)	Lot	1				
P1.2.4	Tower Type 4D45	Lot	1				
P1.2.5	Tower Type 4DT6	Lot	1				
P1.2.6	Tower Type 4DR	Lot	1				
P1.2.7	Tower Type 4DAX	Lot	1				
P1.3	Foundation design for all soil types	Lot	1				
TOTAL (to Schedule of Grand Summary)							

All the costs, require for design purpose to complete the Contractual obligation, shall deem to be included in the above design costs.

Name of Bidder

Signature of Bidder

¹Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1 in Single-stage Bid.



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 3. Design Services**

Item no.	Description	Unit	Qty.	Unit Price ¹		Total Price ¹	
				Foreign Currency Portion (in USD) (2)	Local Currency Portion (in BDT) (3)	Foreign (in USD) 4='(1) x (2)	Local (in BDT) 5='(1)x(3)
P1.1	Line Design						
	Detailed line design including plan and profiles; conductor, earthwire and OPGW sag tension calculations; tower spotting, establishment of line schedule; Design of insulator strings, OPGW and earthwire attachments.	Lot	1				
P1.2	Tower Design						
	Design of fabrication drawings and shop drawings including body extensions, hill-side extensions, stubs, and signs as per specifications						
P1.2.1	Tower type 4DL	Lot	1				
P1.2.2	Tower type 4D1	Lot	1				
P1.2.3	Tower type 4D25 (4DXP)	Lot	1				
P1.2.4	Tower Type 4D45	Lot	1				
P1.2.5	Tower Type 4DT6	Lot	1				
P1.2.6	Tower Type 4DR	Lot	1				
P1.2.7	Tower Type 4DAX	Lot	1				
P1.3	Foundation design for all soil types	Lot	1				
TOTAL (to Schedule of Grand Summary)							

All the costs, require for design purpose to complete the Contractual obligation, shall deem to be included in the above design costs.

Name of Bidder

Signature of Bidder

¹Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1 in Single-stage Bid.



SECTION A: Transmission Line Portion - Padma River Crossing Portion**Schedule No. 3. Design Services**

Item no.	Description	Unit	Qty.	Unit Price ¹		Total Price ¹	
				Foreign Currency Portion (in USD) (2)	Local Currency Portion (in BDT) (3)	Foreign (in USD) 4= '(1) x (2)	Local (in BDT) 5= '(1)x(3)
P1.1	Line Design						
	Detailed line design including plan and profiles; conductor, earthwire and OPGW sag tension calculations; tower spotting, establishment of line schedule; Design of insulator strings, OPGW and earthwire attachments.	Lot	1				
P1.2	Tower Design						
	Design of fabrication drawings and shop drawings including body extensions, hill-side extensions, stubs, and signs as per specifications						
P1.2.1	Tower Type 4DR	Lot	1				
P1.2.2	Tower Type 4DAX	Lot	1				
P1.3	Foundation design for all soil types	Lot	1				
TOTAL (to Schedule of Grand Summary)							

All the costs, require for design purpose to complete the Contractual obligation, shall deem to be included in the above design costs.

Name of Bidder

Signature of Bidder

¹Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1 in Single-stage Bid.



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
				1	2	3	4 = 1x2	5 = 1x3
P1	Towers							
	Erection of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.							
	Overland Portion							
P1.1	Tower type 4DL							
P1.1.1	Tower type 4DL Standard		each	21				
P1.1.2	Tower type 4DL E1.5		each	15				
P1.1.3	Tower type 4DL E3		each	25				
P1.1.4	Tower type 4DL E4.5		each	50				
P1.1.5	Tower type 4DL E6		each	80				
P1.1.6	Tower type 4DL E9		each	140				
P1.2	Tower type 4D1							
P1.2.1	Tower type 4D1 Standard		each	1				
P1.2.2	Tower type 4D1 E1.5		each	1				
P1.2.3	Tower type 4D1 E3		each	1				
P1.2.4	Tower type 4D1 E4.5		each	1				
P1.2.5	Tower type 4D1 E6		each	2				
P1.2.6	Tower type 4D1 E9		each	1				
P1.2.7	Tower type 4D1 E12		each	1				
P1.2.8	Tower type 4D1 E15		each	4				
P1.2.9	Tower type 4D1 E20		each	4				
P1.2.10	Tower type 4D1 E25		each	3				
P1.2.11	Tower type 4D1 E30		each	3				
P1.2.12	Tower type 4D1 E40		each	2				
P1.3	Tower type 4D25 (4DXP)							
P1.3.1	Tower type 4D25 Standard		each	1				
P1.3.2	Tower type 4D25 E1.5		each	1				
P1.3.3	Tower type 4D25 E3		each	7				
P1.3.4	Tower type 4D25 E4.5		each	1				
P1.3.5	Tower type 4D25 E6		each	6				
P1.3.6	Tower type 4D25 E9		each	12				
P1.3.7	Tower type 4D25(4DXP) E6		each	2				
P1.4	Tower Type 4D45							
P1.4.1	Tower type 4D45 Standard		each	1				
P1.4.2	Tower type 4D45 E1.5		each	1				
P1.4.3	Tower type 4D45 E3		each	4				
P1.4.4	Tower type 4D45 E4.5		each	1				
P1.4.5	Tower type 4D45 E6		each	14				
P1.4.6	Tower type 4D45 E9		each	6				
P1.5	Tower Type 4DT6							
P1.5.1	Tower type 4DT6 Standard		each	1				
P1.5.2	Tower type 4DT6 E1.5		each	1				
P1.5.3	Tower type 4DT6 E3		each	1				
P1.5.4	Tower type 4DT6 E4.5		each	1				
P1.5.5	Tower type 4DT6 E6		each	1				
P1.5.6	Tower type 4DT6 E9		each	3				
	River Crossing Portion (Item A1.6 and A1.7)							
P1.6	Tower Type 4DR							
P1.6.1	Tower Type 4DR1 Standard		each	2				
P1.6.2	Tower Type 4DR1 E10		each	2				
P1.6.3	Tower Type 4DR1 E30		each	2				
P1.6.4	Tower Type 4DR2		each	2				
P1.7	Tower Type 4DAX							
P1.7.1	Tower Type 4DAX Standard		each	8				
P1.8	Auxiliary Crossarm for tower							



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P1.8.1	Auxiliary crossarm for tower type 4DT6		per set of three	2				
P1.9	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	14				
P1.10	Tower Paint, Warning spheres							
P1.10.1	Painting of tower having height more than 45meter in accordance with the requirements of the Technical Specification		per tower	25				
P1.10.2	Painting of tower (Reflecting Paint) upto 3 meter in submerge area in accordance with the requirements of the Technical Specification		per tower	20				
P1.10.3	Aircraft warning spheres for ACSR "Dorking" earthwire-Overland		each	160				
P1.10.4	Aircraft warning spheres for ACSR Dorking earthwire equivalent OPGW-overland		each	160				
P1.10.5	Aircraft warning spheres for 19x3.67 20SA earthwire-River Crossing Portion		each	53				
P1.10.6	Aircraft warning spheres for 19x3.67 20SA earthwire equivalent OPGW -River Crossing Portion		each	53				
P1.11	Tower Test							
P1.11.1	Proto assembly of all type towers with all extensions to prove compliance with specification. Payment for successful test only.							
(a)	Contractor to fill up, if required							
(b)	Contractor to fill up, if required							
(c)	Contractor to fill up, if required							
(d)	Contractor to fill up, if required							
P1.12	Route Survey & Clearance							
P1.12.1	Check Survey in accordance with the requirements of the technical specification, incl. full ground survey with change of route, if any, tower plotting and preparation and submission of route maps, profile drawings, SIMM document, etc.		km	178.546				
P1.12.2	Route clearance in accordance with requirements of the technical specification including payment of damage compensation		km	178.546				
P1.13	Foundations							
	Foundations for towers including all setting out, Concrete, Reinforcement, Excavation, Pumping, Stub-cutting, Geotechnical Investigation (Level 2), Shuttering, Leveling, Timbering, supply & Installation of foundation steelwork, Earthing Materials, Backfilling, approved Protective Coating & site clearing etc.							
P1.13.1	Tower Type 4DL							
P1.13.1.1	Deep Foundation for Soil Category-2		Per tower	17				
P1.13.1.2	Deep Foundation for Soil Category-3		Per tower	66				
P1.13.1.3	Deep Foundation for Soil Category-4		Per tower	83				
P1.13.1.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	3				



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P1.13.1.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	13				
P1.13.1.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	13				
P1.13.1.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	52				
P1.13.1.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	17				
P1.13.1.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	67				
P1.13.2	Tower Type 4D1							
P1.13.2.1	Deep Foundation for Soil Category-2		Per tower	1				
P1.13.2.2	Deep Foundation for Soil Category-3		Per tower	5				
P1.13.2.3	Deep Foundation for Soil Category-4		Per tower	5				
P1.13.2.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	1				
P1.13.2.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	1				
P1.13.2.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P1.13.2.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	3				
P1.13.2.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				
P1.13.2.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	4				
P1.13.2.10	River Crossing Foundation for 4D1 tower at Payra S/S end		Per tower	2				
P1.13.3	Tower type 4D25 (4DXP)							
P1.13.3.1	Deep Foundation for Soil Category-2		Per tower	2				
P1.13.3.2	Deep Foundation for Soil Category-3		Per tower	6				
P1.13.3.3	Deep Foundation for Soil Category-4		Per tower	8				
P1.13.3.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	1				
P1.13.3.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	1				
P1.13.3.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P1.13.3.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	4				
P1.13.3.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	2				
P1.13.3.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	5				
P1.13.4	Tower Type 4D45							
P1.13.4.1	Deep Foundation for Soil Category-2		Per tower	1				
P1.13.4.2	Deep Foundation for Soil Category-3		Per tower	5				
P1.13.4.3	Deep Foundation for Soil Category-4		Per tower	7				
P1.13.4.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	1				
P1.13.4.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	1				
P1.13.4.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P1.13.4.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	4				
P1.13.4.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				
P1.13.4.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	6				



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P1.13.5	Tower Type 4DT60							
P1.13.5.1	Deep Foundation for Soil Category-2		Per tower	0				
P1.13.5.2	Deep Foundation for Soil Category-3		Per tower	1				
P1.13.5.3	Deep Foundation for Soil Category-4		Per tower	1				
P1.13.5.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	1				
P1.13.5.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	1				
P1.13.5.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P1.13.5.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	1				
P1.13.5.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				
P1.13.5.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	1				
P1.13.6	Tower Type 4DR (River Crossing Towers)							
P1.13.6.1	4DR1		Per tower	6				
P1.13.6.2	4DR2		Per tower	2				
P1.13.7	Tower Type 4DAX (Anchor Towers)							
P1.13.7.1	4DAX		Per tower	8				
P1.14	Geotechnical investigation in accordance with the requirements of the Technical Specification							
P1.14.1	Level 2		borehole	420				
P1.14.2	Level 4		borehole	16				
P1.15	Testing of Foundations							
	Overland Portion							
P1.15.1	Individual Pile test including supply,install and test to prove compliance with technical specification, payment for successful test only (applicable for all tower types selected by the Employer's Engineer):							
(a)	Compression test		per test	5				
(b)	Uplift test		per test	5				
(c)	Pile Integrity test		per test	1680				
	River Crossing Portion							
P1.15.2	Individual Pile test including supply,install and test to prove compliance with technical specification, payment for successful test only (applicable for all tower types selected by the Employer's Engineer):							
(a)	Compression test - 4DR1		per test	1				
(b)	Compression test - 4DR2		per test	1				
(c)	Uplift test- 4DAX		per test	2				
(d)	Pile Integrity test		per test	64				
P1.16	Erection of insulator and fittings							
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn, Arcing ring etc							
	400kV Overland Portion							
P1.16.1	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Suspension) - disc only		set	1986				
	b) 210kN twin suspension Insulators Fittings set for Quad Bundle ACSR Finch Conductor (Suspension) - hardware fittings only		set	1986				



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P1.16.2	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Heavy Suspension) - disc only		set	144				
	b) 210kN twin suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	144				
P1.16.3	a) 210kN jumper suspension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	486				
	b) 210kN jumper suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	486				
P1.16.4	a) 400kN twin tension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	816				
	b) 400kN twin tension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	816				
P1.16.5	a) 210kN single upright low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12				
	b) 210kN single upright low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12				
P1.16.6	a) 210kN single inverted low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12				
	b) 210kN single inverted low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12				
P1.16.7	Spacer damper for Quad Bundle ACSR Finch Conductor		span-phase	2538				
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasesxN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.							
P1.16.8	Vibration Damper for Quad Bundle ACSR Finch Conductor		span	423				
P1.16.9	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	1182				
P1.16.10	Vibration damper for ACSR "Dorking" earthwire		span	423				
P1.16.11	Suspension set for ACSR "Dorking" earthwire		each	331				
P1.16.12	Tension set for ACSR "Dorking" earthwire		each	138				
P1.16.13	Vibration Damper for ACSR Dorking earthwire equivalent OPGW		span	423				
P1.16.14	Suspension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	331				
P1.16.15	Tension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	138				
P1.16.16	Counterweights for 210kN suspension insulator sets complete with yoke plate attachment bolts to be used for 4D1 towers:							
(a)	- 40kg set		each	8				
(b)	- 80kg set		each	6				
(c)	- 120kg set		each	10				



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P1.17	400kV River Crossing Portion							
P1.17.1	a) 300kN tripple suspension Insulators set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - disc only		set	36				
	b) 300kN tripple suspension Insulators Fittings set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - hardware fittings only		set	36				
P1.17.2	a) 300kN tripple suspension Insulators set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) - disc only		set	12				
	b) 300kN tripple suspension Insulators Fittings set with double AGS Clamp for Quadruple "ACCC ULS 724/71 DHAKA" Conductor (Suspension) -		set	12				
P1.17.3	a) 400kN tripple tension Insulators Set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor - disc only		set	48				
	b) 400kN tripple tension Insulators Fittings Set for Quadruple "ACCC ULS 724/71 DHAKA" Conductor - hardware fittings only		set	48				
P1.17.4	Spacer damper for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		span-phase	72				
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phasesxN', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.							
P1.17.5	Vibration Damper for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		span	12				
P1.17.6	Jumper Spacer for Quadruple "ACCC ULS 724/71 DHAKA" Conductor		each	144				
P1.17.7	Vibration damper for 19x3.67 20SA earthwire		span	12				
P1.17.8	Suspension set for 19x3.67 20SA earthwire		each	8				
P1.17.9	Tension set for 19x3.67 20SA earthwire		each	8				
P1.17.10	Vibration Damper for 19x3.67 20SA Earthwire equivalent OPGW		span	12				
P1.17.11	19x3.67 20SA Earthwire equivalent OPGW suspension set, complete assembly		each	8				
P1.17.12	19x3.67 20SA Earthwire equivalent OPGW tension set, complete assembly		each	8				
P1.18	Erection of phase conductor, earthwire and OPGW							
	Overland Portion							
P1.18.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	176.25				
	b) Necessary midspan joints and repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	176.25				
P1.18.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	176.25				
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	176.25				



SECTION A: Transmission Line Portion - Payra to Gopalganj Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P1.18.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	176.25				
P1.19	River Crossing Portion							
P1.19.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	2.296				
	b) Necessary repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	2.296				
P1.19.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	2.296				
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	2.296				
P1.19.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	2.296				
P1.20	MISCELLANEOUS							
P1.20.1	Erection of earthwire connection from terminal tower to substation gantry		per wire	4				
P1.20.2	Erection of OPGW connection from terminal tower to substation Gantry/Mast		per wire	4				
P1.20.3	Additional counterpoise earthing in accordance with requirement of the Technical specification		per meter	50				
P1.20.4	Miscellaneous Rates for works certified by the Engineer in accordance with method of Payment							
(a)	Additional Excavation		cu.m	500				
(b)	Additional Concrete		cu.m	100				
(c)	Additional Reinforcement		kg	1000				
(d)	Extra for surface resisting cement per cu.m of concrete		cu.m	100				
(e)	Additional Boring (500mm diameter)		rm	50				
(f)	Additional Boring (600mm diameter)		rm	50				
(g)	Additional Boring (750mm diameter)		rm	50				
(h)	Sand Filling		cu.m	500				
TOTAL (Grand Summary)								

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders (ITB).

SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
				1	2	3	4 = 1x2	5 = 1x3
P2	Towers							
	Erection of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.							
	Overland Portion							
P2.1	Tower type 4DL							
P2.1.1	Tower type 4DL Standard		each	54				
P2.1.2	Tower type 4DL E1.5		each	18				
P2.1.3	Tower type 4DL E3		each	45				
P2.1.4	Tower type 4DL E4.5		each	18				
P2.1.5	Tower type 4DL E6		each	18				
P2.1.6	Tower type 4DL E9		each	27				
P2.2	Tower type 4D1							
P2.2.1	Tower type 4D1 Standard		each	1				
P2.2.2	Tower type 4D1 E1.5		each	1				
P2.2.3	Tower type 4D1 E3		each	1				
P2.2.4	Tower type 4D1 E4.5		each	2				
P2.2.5	Tower type 4D1 E6		each	2				
P2.2.6	Tower type 4D1 E9		each	2				
P2.2.7	Tower type 4D1 E12		each	2				
P2.2.8	Tower type 4D1 E15		each	2				
P2.2.9	Tower type 4D1 E20		each	2				
P2.2.10	Tower type 4D1 E25		each	2				
P2.2.11	Tower type 4D1 E30		each	2				
P2.2.12	Tower type 4D1 E40		each	2				
P2.3	Tower type 4D25 (4DXP)							
P2.3.1	Tower type 4D25 Standard		each	2				
P2.3.2	Tower type 4D25 E1.5		each	1				
P2.3.3	Tower type 4D25 E3		each	2				
P2.3.4	Tower type 4D25 E4.5		each	2				
P2.3.5	Tower type 4D25 E6		each	2				
P2.3.6	Tower type 4D25 E9		each	2				
P2.3.7	Tower type 4D25(4DXP) E6		each	2				
P2.4	Tower Type 4D45							
P2.4.1	Tower type 4D45 Standard		each	3				
P2.4.2	Tower type 4D45 E1.5		each	2				
P2.4.3	Tower type 4D45 E3		each	1				
P2.4.4	Tower type 4D45 E4.5		each	1				
P2.4.5	Tower type 4D45 E6		each	1				
P2.4.6	Tower type 4D45 E9		each	2				
P2.5	Tower Type 4DT6							
P2.5.1	Tower type 4DT6 Standard		each	1				
P2.5.2	Tower type 4DT6 E1.5		each	1				
P2.5.3	Tower type 4DT6 E3		each	1				
P2.5.4	Tower type 4DT6 E4.5		each	1				
P2.5.5	Tower type 4DT6 E6		each	1				
P2.5.6	Tower type 4DT6 E9		each	2				
P2.6	Auxiliary Crossarm for tower							
P2.6.1	Auxiliary crossarm for tower type 4DT6		per set of three	4				
P2.6.2	Air craft obstruction lights solar powered complete with lamps, solar, panels, batteries, control equipment cables, support framework, tower work platform etc.		per tower	14				



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P2.7	Tower Paint, Warning spheres							
P2.7.1	Painting of tower having height more than 45meter in accordance with the requirements of the Technical Specification		per tower	25				
P2.7.2	Painting of tower (Reflecting Paint) upto 3 meter in submerge area in accordance with the requirements of the Technical Specification		per tower	20				
P2.7.3	Aircraft warning spheres for ACSR "Dorking" earthwire-Overland		each	100				
P2.7.4	Aircraft warning spheres for ACSR Dorking earthwire equivalent OPGW-overland		each	100				
P2.8	Tower Test							
P2.8.1	Proto assembly of all type towers with all extensions to prove compliance with specification. Payment for successful test only.							
(a)	Contractor to fill up, if required							
(b)	Contractor to fill up, if required							
(c)	Contractor to fill up, if required							
(d)	Contractor to fill up, if required							
P2.9	Route Survey & Clearance							
P2.9.1	Check Survey in accordance with the requirements of the technical specification, incl. full ground survey with change of route, if any, tower plotting and preparation and submission of route maps, profile drawings, SIMM document, etc.		km	73.291				
P2.9.2	Route clearance in accordance with requirements of the technical specification including payment of damage compensation		km	73.291				
P2.10	Foundations							
	Foundations for towers including all setting out, Concrete, Reinforcement, Excavation, Pumping, Stub-cutting, Geotechnical Investigation (Level 2), Shuttering, Leveling, Timbering, supply & Installation of foundation steelwork, Earthing Materials, Backfilling, approved Protective Coating & site clearing etc.							
P2.10.1	Tower Type 4DL							
P2.10.1.1	Deep Foundation for Soil Category-2		Per tower	30				
P2.10.1.2	Deep Foundation for Soil Category-3		Per tower	42				
P2.10.1.3	Deep Foundation for Soil Category-4		Per tower	59				
P2.10.1.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	3				
P2.10.1.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	3				
P2.10.1.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	8				
P2.10.1.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	8				
P2.10.1.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	9				
P2.10.1.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	18				
P2.10.2	Tower Type 4D1							
P2.10.2.1	Deep Foundation for Soil Category-2		Per tower	3				
P2.10.2.2	Deep Foundation for Soil Category-3		Per tower	3				



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P2.10.2.3	Deep Foundation for Soil Category-4		Per tower	6				
P2.10.2.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	1				
P2.10.2.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	1				
P2.10.2.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P2.10.2.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	1				
P2.10.2.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				
P2.10.2.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	2				
P2.10.3	Tower type 4D25 (4DXP)							
P2.10.3.1	Deep Foundation for Soil Category-2		Per tower	1				
P2.10.3.2	Deep Foundation for Soil Category-3		Per tower	1				
P2.10.3.3	Deep Foundation for Soil Category-4		Per tower	3				
P2.10.3.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	0				
P2.10.3.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	0				
P2.10.3.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P2.10.3.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	1				
P2.10.3.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				
P2.10.3.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	1				
P2.10.4	Tower Type 4D45							
P2.10.4.1	Deep Foundation for Soil Category-2		Per tower	1				
P2.10.4.2	Deep Foundation for Soil Category-3		Per tower	1				
P2.10.4.3	Deep Foundation for Soil Category-4		Per tower	4				
P2.10.4.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	0				
P2.10.4.4	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	0				
P2.10.4.5	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P2.10.4.6	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	1				
P2.10.4.7	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				
P2.10.4.8	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	1				
P2.10.5	Tower Type 4DT60							
P2.10.5.1	Deep Foundation for Soil Category-2		Per tower	1				
P2.10.5.2	Deep Foundation for Soil Category-3		Per tower	1				
P2.10.5.3	Deep Foundation for Soil Category-4		Per tower	1				
P2.10.5.4	Deep Foundation (1 meter raised chimney) for soil category-2		Per tower	0				
P2.10.5.5	Deep Foundation (2 meter raised chimney) for soil category-2		Per tower	0				
P2.10.5.6	Deep Foundation (1 meter raised chimney) for soil category-3		Per tower	1				
P2.10.5.7	Deep Foundation (2 meter raised chimney) for soil category-3		Per tower	1				
P2.10.5.8	Deep Foundation (1 meter raised chimney) for soil category-4		Per tower	1				



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P2.10.5.9	Deep Foundation (2 meter raised chimney) for soil category-4		Per tower	1				
P2.10.5.10	River Crossing Foundation for Normal (Non-River Crossing) Tower							
(a)	Pile foundation for tower type "4D1"		Per tower	4				
(b)	Pile foundation for tower type "4D25"		Per tower	2				
(c)	Pile foundation for tower type "4DT60"		Per tower	1				
P2.11	Geotechnical investigation in accordance with the requirements of the Technical Specification							
P2.11.1	Level 2		borehole	221				
P2.11.2	Level 4		borehole	10				
P2.12	Testing of Foundations							
	Overland Portion							
P2.12.1	Individual Pile test including supply,install and test to prove compliance with technical specification, payment for successful test only (applicable for all tower types selected by the Employer's Engineer):							
(a)	Compression test		per test	6				
(b)	Uplift test		per test	6				
(c)	Pile Integrity test		per test	928				
P2.13	Erection of insulator and fittings							
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods, arcing horn, Arcing ring etc							
	400kV Overland Portion							
P2.13.1	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Suspension) - disc only		set	1080				
	b) 210kN twin suspension Insulators Fittings set for Quad Bundle ACSR Finch Conductor (Suspension) - hardware fittings only		set	1080				
P2.13.2	a) 210kN twin suspension Insulators set for Quad Bundle ACSR Finch Conductor (Heavy Suspension) - disc only		set	138				
	b) 210kN twin suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	138				
P2.13.3	a) 210kN jumper suspension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	141				
	b) 210kN jumper suspension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	141				
P2.13.3	a) 400kN twin tension Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	348				
	b) 400kN twin tension Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	348				
P2.13.4	a) 210kN single upright low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12				
	b) 210kN single upright low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12				



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P2.13.5	a) 210kN single inverted low duty Insulators Set for Quad Bundle ACSR Finch Conductor - disc only		set	12				
	b) 210kN single inverted low duty Insulators Fittings Set for Quad Bundle ACSR Finch Conductor - hardware fittings only		set	12				
P2.13.6	Spacer damper for Quad Bundle ACSR Finch Conductor		span-phase	231				
	**Span-phase=No. of span x 6. Total quantities of spacer or spacer dampers shall be 'Span-phase x N', where N= Number of spacer dampers for each phase in each span which shall be determined by contractor based on the design of spacer or spacer dampers. The price quoted shall remain unchanged, even if the value of N increases during final design of the spacer or dampers and it's approval thereof.							
P2.13.7	Vibration Damper for Quad Bundle ACSR Finch Conductor		span	231				
P2.13.8	Jumper Spacer for Quad Bundle ACSR Finch Conductor		each	1320				
P2.13.9	Vibration damper for ACSR "Dorking" earthwire		span	423				
P2.13.10	Suspension set for ACSR "Dorking" earthwire		each	203				
P2.13.11	Tension set for ACSR "Dorking" earthwire		each	58				
P2.13.12	Vibration Damper for ACSR Dorking earthwire equivalent OPGW		span	231				
P2.13.13	Suspension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	203				
P2.13.14	Tension set for ACSR Dorking earthwire equivalent OPGW, complete assembly		each	58				
P2.13.15	Counterweights for 210kN suspension insulator sets complete with yoke plate attachment bolts to be used for 4D1 towers:							
(a)	- 40kg set		each	5				
(b)	- 80kg set		each	5				
(c)	- 120kg set		each	3				
P2.14	Erection of phase conductor, earthwire and OPGW							
	Overland Portion							
P2.14.1	a) Quad Bundle ACSR Finch Conductor (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	73.291				
	b) Necessary midspan joints and repair sleeves (3 Phase, Double Circuit, Quad Bundle per phase on the line)		route-km	73.291				
P2.14.2	a) ACSR "Dorking" earthwire. One earthwire on the line.		route-km	73.291				
	b) Necessary midspan joints and repair sleeves, one ACSR "Dorking" earthwire on the line		route-km	73.291				
P2.14.3	ACSR Dorking equivalent OPGW inclusive of joint boxes, fixing clamps, fusion splices and connections to the joint boxes. One OPGW earthwire on the line.		route-km	73.291				
P2.15	MISCELLANEOUS							
P2.15.1	Erection of earthwire connection from terminal tower to substation gantry		per wire	2				
P2.15.2	Erection of OPGW connection from terminal tower to substation Gantry/Mast		per wire	2				



SECTION A: Transmission Line Portion - Gopalganj to Aminbazar Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P2.15.3	Additional counterpoise earthing in accordance with requirement of the Technical specification		per meter	50				
P2.15.4	Miscellaneous Rates for works certified by the Engineer in accordance with method of Payment							
(a)	Additional Excavation		cu.m	500				
(b)	Additional Concrete		cu.m	100				
(c)	Additional Reinforcement		kg	1000				
(d)	Extra for surface resisting cement per cu.m of concrete		cu.m	100				
(e)	Additional Boring (500mm diameter)		rm	50				
(f)	Additional Boring (600mm diameter)		rm	50				
(g)	Additional Boring (750mm diameter)		rm	50				
(h)	Sand Filling		cu.m	500				
TOTAL (Grand Summary)								

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders (ITB).

SECTION A: Transmission Line Portion - Padma River Crossing**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
				1	2	3	4 = 1x2	5 = 1x3
P3.1	Survey and soil investigation works of Padma River Crossing							
P3.1.1	Survey Work of Padma River Crossing							
P3.1.1.1	Check survey in accordance with the requirements of the technical specification, incl. Full ground survey with change of route, if any, tower plotting and preparation and submission of route maps, profile drawings, SIMM documents, etc.		km	6.777				
P3.1.2	Geotechnical Investigations incl. taking samples, logging and lab testing							
P3.1.2.1	Boreholes (minimum one per tower), incl. laboratory test, borehole logs, sampling and interpretive report as per geotechnical specification							
(a)	Level 2		borehole	0				
(b)	Level 4		borehole	2				
P3.1.2.2	Soil resistivity tests (one per tower)		unit	4				
P3.2	Foundations for towers including all setting out, Concrete, Reinforcement, Excavation, Pumping, Stub-setting, Geotechnical Investigation (Level 2), Shuttering, Leveling, Timbering, supply & Installation of foundation steelwork, Earthing Materials, Backfilling, approved Protective Coating & site clearing etc.							
P3.2.1	Special foundation for tower type "4DR" Suspension Tower with 6M raised chimney (T6 & T14)		per tower	2				
P3.2.2	Special foundation for tower type "4DAX" Anchor Tower with 3M raised chimney (T5 & T15)		per tower	2				
P3.3	Erection of 400kV double circuit towers complete with all stubs, nuts, bolts, locking nuts, washers, phase conductor and earthwire swivels/shackles, step bolts, tower notice and identification plates, ACDs, protective coating, earthing etc.							
P3.3.1	Tower type "4DR" Suspension Tower (T6 to T14)		each	9				
P3.3.2	Tower type "4DAX" Anchor Tower (T5 & T15)		each	2				
P3.4	Stringing of double circuit line, four conductors per phase, 1 OPGW and 1 19 x 3.67, 20-SA type earthwire (length approx. route km) for Padma River Crossing							
P3.4.1	Conductor "ACCC 724/71 DHAKA" (Double circuit line, both circuits erected, four conductors per phase) including: Installation of insulation strings, compressed dead-ends, compression junction sleeves, suspension clamps, Sagging and clipping, Installation of armour rods and dampers, Pilot strings and jumpers		route km	6.777				



SECTION A: Transmission Line Portion - Padma River Crossing**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
P3.4.2	One optical fibre ground wire, 48 fibres OPGW, mechanically compatible with ACSR Dorking shield wire: including: Tension and semi-tension joints, suspension clamps, armour rods and dampers, Sagging and clipping, Installation of intermediate junction boxes and terminal junction boxes at substation gantries, Earthing jumpers		route km	6.777				
P3.4.3	One earth shield wire 19 x 3.67, 20 SA type including Compressed dead-ends, compression junction sleeves suspension clamps, armour rods and dampers, Sagging and clipping, Earthing jumpers, warning sphere (if required)		route km	6.777				
P3.5	Individual Pile test including supply, install and test to prove compliance with technical specification, payment for successful test only (applicable for all tower types selected by the Employer's Engineer):							
(a)	Compression test - 4DR		per test	1				
(b)	Uplift test- 4DAX		per test	1				
(c)	Pile Integrity test		per test	44				
P3.6	MISCELLANEOUS							
P3.6.1	Painting of bottom part of towers		lump sum	1				
P3.6.3	Additional counterpoise earthing in accordance with requirement of the Technical specification		per meter	50				
P3.6.4	Miscellaneous Rates for works certified by the Engineer in accordance with method of Payment							
(a)	Additional Excavation		cu.m	500				
(b)	Additional Concrete		cu.m	100				
(c)	Additional Reinforcement		kg	1000				
(d)	Extra for surface resisting cement per cu.m of concrete		cu.m	100				
(e)	Additional Boring (500mm diameter)		rm	50				
(f)	Additional Boring (600mm diameter)		rm	50				
(g)	Additional Boring (750mm diameter)		rm	50				
(h)	Sand Filling		cu.m	500				
TOTAL (Grand Summary)								

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders (ITB).

SECTION A: Transmission Line Portion**Schedule No. 5. Grand Summary**

Item	Description	Total Price ¹	
		Local Currency Portion [BDT]	Foreign Currency Portion [USD]
1	Plant and Mandatory Spare Parts Supplied from Abroad²		
P1	P1.Schedule No. 1: Plant and Mandatory Spare Parts Supplied from Abroad - Payra to Gopalganj Portion		
P2	P2.Schedule No. 1: Plant and Mandatory Spare Parts Supplied from Abroad - Gopalganj to Aminbazar Portion		
P3	P3.Schedule No. 1: Plant and Mandatory Spare Parts Supplied from Abroad - Padma River Crossing		
2	Plant and Mandatory Spare Parts Supplied from Within the Employer's Country²		
P1	P1.Schedule No. 2: Plant and Mandatory Spare Parts Supplied from Employer's Country - Payra to Gopalganj Portion		
P2	P2.Schedule No. 2: Plant and Mandatory Spare Parts Supplied from Employer's Country - Gopalganj to Aminbazar Portion		
P3	P3.Schedule No. 2: Plant and Mandatory Spare Parts Supplied from Employer's Country - Padma River Crossing		
3	Design Services		
P1	P1.Schedule No. 3: Design Services - Payra to Gopalganj Portion		
P2	P2.Schedule No. 3: Design Services - Gopalganj to Aminbazar Portion		
P3	P3.Schedule No. 3: Design Services - Padma River Crossing		
4	Installation and Other Services		
P1	P1.Schedule No. 4: Installation and Other Services - Payra to Gopalganj Portion		
P2	P2.Schedule No. 4: Installation and Other Services - Gopalganj to Aminbazar Portion		
P3	P3.Schedule No. 4: Installation and Other Services - Padma River Crossing		
Grand Total to be carried forward to Letter of Price Bid			
Contractor's Investment (as a Percentage of Contract Price)		%	

Name of Bidder _____
Signature of Bidder _____

1. Specify currencies in accordance with ITB 19.1 of the BDS. Create additional columns for up to a maximum of three foreign currencies, if so required.



SECTION B: Switchyard and Sub Station Portion**Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Aboard**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP	Total Price CIP
				1	2	3=1x2
P4	Gopalganj Sub-Station					
P4.1	400kV AIS Line Bays		each	4		
P4.2	Bus Tie Bays		each	2		
P4.3	Extension of SAS (hardware and software), DC/UPS, FO Multiplexer, PLC Equipment, earthing, civil works including buildings, roads and landscaping works and other systems as needed at Gopalganj Sub-Station		Lot	1		
P5	Aminbazar Sub-Station					
P5.1	400kV AIS Line Bays		each	2		
P5.2	Bus Tie Bays		each	2		
P5.3	Extension of SAS (hardware and software), DC/UPS, FO Multiplexer, PLC Equipment, earthing, civil works including buildings, roads and landscaping works and other systems as needed at Aminbazar Sub-Station		Lot	1		
P45.1	NLDC Works					
P45.1.1	Modification at NLDC to enable tele-control and tele-metering facilities of the extension bays		Lot	1		
P45.2	MISCELLANEOUS					
P45.2.1	Factory Acceptance Tests (Overseas and Local)		Lot	1		
S.P45	SPARES					
S.P45.1	SF6 Gas in Spare Cylinders at Gopalganj and Aminbazar Sub-Stations					
S.P45.2	SF6 gas filtering, drying, storage, filling and evacuation plant		set	2		
S.P45.3	SF6 Leak Detector		set	2		
S.P45.4	Operational Analyzer		set	2		
S.P45.5	Other spares as described in the specification		Lot	1		
TOTAL (Grand Summary)						
			Name of Bidder			
			Signature of Bidder			

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are

Country of Origin Declaration Form

Item	Description	Code	Country



SECTION B: Switchyard and Sub Station Portion**Schedule No. 2. Plant and Mandatory Spare Parts Supplied from within Employers Country**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² EXW	Total Price EXW
				1	2	3=1x2
P4	Gopalganj Sub-Station					
P4.1	400kV AIS Line Bays		each	4		
P4.2	Bus Tie Bays		each	2		
P4.3	Extension of SAS (hardware and software), DC/UPS, FO Multiplexer, PLC Equipment, earthing, civil works including buildings, roads and landscaping works and other systems as needed at Gopalganj Sub-Station		Lot	1		
P5	Aminbazar Sub-Station					
P5.1	400kV AIS Line Bays		each	2		
P5.2	Bus Tie Bays		each	2		
P5.3	Extension of SAS (hardware and software), DC/UPS, FO Multiplexer, PLC Equipment, earthing, civil works including buildings, roads and landscaping works and other systems as needed at Aminbazar Sub-Station		Lot	1		
P45.1	NLDC Works					
P45.1.1	Modification at NLDC to enable tele-control and tele-metering facilities of the extension bays		Lot	1		
P45.2	MISCELLANEOUS					
P45.2.1	Factory Acceptance Tests (Overseas and Local)		Lot	1		
S.P45	SPARES					
S.P45.1	SF6 Gas in Spare Cylinders at Gopalganj and Aminbazar Sub-Stations					
S.P45.2	SF6 gas filtering, drying, storage, filling and evacuation plant		set	2		
S.P45.3	SF6 Leak Detector		set	2		
S.P45.4	Operational Analyzer		set	2		
S.P45.5	Other spares as described in the specification		Lot	1		
TOTAL (Grand Summary)						
			Name of Bidder			
			Signature of Bidder			

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specify currency as per provision of Instruction to Bidders. Create and use as many column for Unit Price and total Price as there are

Country of Origin Declaration Form

Item	Description	Code	Country



SECTION B: Switchyard and Sub Station Portion**Schedule No. 3. Design Services**

Item no.	Description	Unit	Qty.	Unit Price ¹		Total Price ¹	
				Foreign	Local	Foreign	Local
				Currency Portion (in USD) (2)	Currency Portion (in BDT) (3)	(in USD) 4='(1) x (2)	(in BDT) 5='(1)x(3)
P4	Extension Works at Gopalganj Sub-Station	Lot	1				
P5	Extension Works at Aminbazar Sub-Station	Lot	1				
P45	Modifications at NLDC	Lot	1				
TOTAL (to Schedule of Grand Summary)							

All the costs, require for design purpose to complete the Contractual obligation, shall deem to be included in the above design costs.

Name of Bidder

Signature of Bidder

¹Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1 in Single-stage Bid.



SECTION B: Switchyard and Sub Station Portion**Schedule No. 4: Installation and other Services**

Item no.	Description of Works	Code ¹	Unit	Qty	Unit Price ² CIP		Total Price CIP	
					Foreign Currency	Local Currency	Foreign Currency	Local Currency
				1	2	3	4 = 1x2	5 = 1x3
P4	Gopalganj Sub-Station							
P4.1	400kV AIS Line Bays		each	4				
P4.2	Bus Tie Bays		each	2				
P4.3	Extension of SAS (hardware and software), DC/UPS, FO Multiplexer, PLC Equipment, earthing, civil works including buildings, roads and landscaping works and other systems as needed at Gopalganj Sub-Station		Lot	1				
P5	Aminbazar Sub-Station							
P5.1	400kV AIS Line Bays		each	2				
P5.2	Bus Tie Bays		each	2				
P5.3	Extension of SAS (hardware and software), DC/UPS, FO Multiplexer, PLC Equipment, earthing, civil works including buildings, roads and landscaping works and other systems as needed at Aminbazar Sub-Station		Lot	1				
P45.1	NLDC Works							
P45.1.1	Modification at NLDC to enable tele-control and tele-metering facilities of the extension bays		Lot	1				
P45.2	MISCELLANEOUS							
P45.2.1	Factory Acceptance Tests (Overseas and Local)		Lot	1				
TOTAL (Grand Summary)								

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.² Specify currency as per provision of Instruction to Bidders (ITB).

SECTION B: Switchyard and Sub-Station Portion**Schedule No. 5. Grand Summary**

Item	Description	Total Price ¹	
		Local Currency Portion [BDT]	Foreign Currency Portion [USD]
1	Plant and Mandatory Spare Parts Supplied from Abroad ²		
2	Plant and Mandatory Spare Parts Supplied from Within the Employer's Country ²		
3	Design Services		
4	Installation and Other Services		
Grand Total to be carried forward to Letter of Price Bid			
Contractor's Investment (as a Percentage of Contract Price)		%	

Name of Bidder _____

Signature of Bidder _____

1. Specify currencies in accordance with ITB 19.1 of the BDS. Create additional columns for up to a maximum of three foreign currencies, if so required.

