SCHEDULE A-C- 33KV SWG LOAD + ATR

Summary & Main System Parameters

Site and substation condition	400/132/33 kV AAWDCP (MAIN SS) substation
	New SS
Substation type	GIS
Site Altitude (m a.s.l.)	≤1000
Minimum ambient temperature (°C)	-10
Design temperature	
Outdoor	50 (°C)
Indoor	40 (°C)
Highest average daily temperature (°C)	38
Relative humidity (%)	4÷100
The climate –day	Dry & Hot
The climate – night	Cold
Pollution level	Heavy airborne contamination
Insulator creepage distance (mm/kV)	38
Wind velocity (m/s)	50
Ice loading, radial thickness (mm)	10
Isoceraunic level (days/annum)	15
Average annual rainfall (cm)	cca. 23
Seismic Conditions	Zone 2B
Solar radiation (W/m2)	1150
Short circuit rating	
400 kV switchgear	40 / 1 sec.
132 kV switchgear	40 / 3 sec.
33 kV switchgear	31.5 / 3 sec.
11 KV side	40 kA / 1 sec.
BUSBAR current rating (A)	
400 kV switchgear	3150
132 kV switchgear	3150
33 kV switchgear	2500
11 KV side	3150

- All outdoor equipment must be suitable for live washing.
- The insulator outdoor creepage distance should be based on 420 kV for 400 kV, 145kV for 132kV, 36kV for 33kV and 12kV for 11 kV.

SUMMARY OF DEFINITE WORK
A/C – AAWDCP 400/132/33KV SUBSTATION --

SECTION FOR PURPOSE OF PAYMENT AND TAKING OVER	SECTION A/C		
APPROXIMATE LOCATION OF SUBSTATION	AQABA (GOVERNORATE) – AAWDCP		
RATED VOLTAGE / HIGHEST VOLTAGE	132 KV / 145KV	33 KV / 36KV	11 KV / 12KV
NORMAL CURRENT RATING OF BUSBARS	3150 A	2500 A	3150 A
TYPE OF SWITCHING ARRANGEMENT	AIS, DOUBLE BUSBAR	AIS, SINGLE BUSBAR 33KV SWITCHGEAR	-
NUMBER OF OHL / FEEDER CIRCUITS	4	AS SLD	-
NUMBER OF TRANSFORMER CIRCUITS	7	AS SLD	-
NUMBER OF INTERBUS ATR 400 KV CIRCUITS	3	AS SLD	-
NUMBER OF BUS SECTION CIRCUITS	1	AS SLD	-
NUMBER OF BUS COUPLER CIRCUITS	1	-	-
NUMBER OF CAPACITOR CIRCUITS	-	AS SLD (INDOOR)	-
RATING OF TRANSFORMER BAY	2500 A	2500 A	3150 A
RATING OF OHTL / FEEDER BAY	2500 A	1250 A	-
RATING OF CAPCITOR BAY	-	1250 A	-
RATING OF BS / BC BAY	3150 A	2500 A	-
SHORT CIRCUIT CURRENT	40KA/3 SEC.	31.5KA/3 SEC.	40 KA/1 SEC.
REQUIRED COMPLETION DATE	AS SPECIFIED IN SCHEDULE B OF THE TENDER		

- All outdoor equipment must be suitable for live washing.
- The insulator creepage distance should be based on 145kV for 132kV and 36kV for 33kV.

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
C1: 33KV MAIN SWITCHGEAR			
C1.1	**33 kV Switchgear**	**33 kV Air-Insulated Switchgear (AIS), Metal Clad type (LSC 2B, IAC AFLR, PM), for 36 kV (70/ 170 kV) rated voltage, for 2500 A rated current and for 31.5 kA rated short-time (3 s) withstand current, for indoor installation with IP41 degree of mechanical protection, all in accordance with IEC 62271-200, comprising of the following Cubicles/Panels:**	
C1.1.1	Cable Feeder Cubicle	33 kV Cable Feeder Cubicle/Panel with the following installed equipment per Cubicle:	16 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 1250 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with five (5) cores with the following characteristics: – I Core: Rated transformation ratio: 800/400/1 A, accuracy class PX for Line Differential Protection. – II Core: Rated transformation ratio: 800/400/1 A, accuracy class 5P20/1, minimum rated output of 15VA for over-current protection, earth fault protection and CB failure protection. – III Core: Rated transformation ratio: 800/400/1 A, accuracy class 0.2s, minimum rated output of 10 VA for instrumentation. – IV Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection, – V Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Check protection.	3 sets
		Single-phase, single pole insulated, cast in epoxy resin, fixed type Voltage Transformer (VT), without primary fuses, all in accordance with IEC 61869-1&3, with two (2) secondary windings with the following characteristics:	3 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.2 for instrumentation with appropriate rated output, – II Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for synchronization with appropriate rated output.	
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
		Cable compartment suitable for connection of 33 kV XLPE insulated cables. ***Note:*** The exact characteristics of incoming 33 kV cables (conductor material, cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set
C1.1.2	Capacitor Bank Cubicle	33 kV Capacitor Bank Cubicle/Panel with the following installed equipment per Cubicle:	7 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), **SF6 type**, 33kV Circuit Breaker (CB), specially designed for capacitor bank application, for 1250 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with four (4) cores with the following characteristics: – I Core: Rated transformation ratio: 200/100/1 A, accuracy class 5P20, minimum rated output of 15 VA for over-current protection, earth-fault protection and overload protection. – II Core: Rated transformation ratio: 200/100/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – III Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection, – IV Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Check protection.	3 sets
		Single-phase, single pole insulated, cast in epoxy resin, fixed type Voltage Transformer (VT), without primary fuses, all in accordance with IEC 61869-1&3, with two (2) secondary windings with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 3P for protection with appropriate rated output. – II Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation with appropriate rated output.	3 sets
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"),	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
		Cable compartment suitable for connection of 33 kV cables with copper conductor and XLPE insulation with capacitor banks. ***Note:*** The exact characteristics of incoming 33 kV cables (conductor cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set
C1.1.3	80MVA Transformer Cubicle	33 kV Transformer Cubicle/Panel with the following installed equipment per Cubicle:	4 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s kA rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with five (5) cores with the following characteristics: – I Core: Rated transformation ratio: 1600/800/1 A, accuracy class PX for transformer differential & REF protection. – II Core: Rated transformation ratio: 1600/800/1 A, accuracy class 5P20/1, minimum rated output of 15 VA for transformer directional over-current protection, earth fault protection, CB failure protection and instrumentation. – III Core: Rated transformation ratio: 1600/800/1 A, accuracy class 0.2S, minimum rated output of 10 VA for Energy Meter. – IV Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection,	3 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– V Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Check protection.	
		Single-phase, single pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT), all in accordance with IEC 61869-1&3, with two (2) secondary windings with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 3P for directional over-current protection & instrumentation with appropriate rated output. – II Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.2 for Energy Meter with appropriate rated output.	3 sets
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
		Cable compartment suitable for connection of 33 kV cables with copper conductor and XLPE insulation with LV side of main transformer. ***Note:*** The exact characteristics of incoming 33 kV cables (conductor cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
C1.1.4	63MVA Transformer Cubicle	33 kV Transformer Cubicle/Panel with the following installed equipment per Cubicle:	3 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s kA rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with five (5) cores with the following characteristics: – I Core: Rated transformation ratio: 1200/600/1 A, accuracy class PX for transformer differential & REF protection. – II Core: Rated transformation ratio: 1200/600/1 A, accuracy class 5P20/1, minimum rated output of 15 VA for transformer directional over-current protection, earth fault protection, CB failure protection and instrumentation. – III Core: Rated transformation ratio: 1200/600/1 A, accuracy class 0.2S, minimum rated output of 10 VA for Energy Meter. – IV Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection, – V Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Check protection.	3 sets
		Single-phase, single pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT), all in accordance with IEC 61869-1&3, with two (2) secondary windings with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 3P for directional over-	3 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		current protection & instrumentation with appropriate rated output. – II Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.2 for Energy Meter with appropriate rated output.	
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
		Cable compartment suitable for connection of 33 kV cables with copper conductor and XLPE insulation with LV side of main transformer. ***Note:*** The exact characteristics of incoming 33 kV cables (conductor cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
C1.1.5	Bus-Section Cubicle (For IPS & BPS1 SWG)	33 kV Bus-Section Cubicle/Panel with the following installed equipment:	2 set
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section I, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 5P20, minimum rated output of 15 VA for over-current protection, earth fault protection, CB failure protection. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets IN EACH SECTION
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section II, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets IN EACH SECTION
		Three phases, three pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT) for bus-bar section I & II, all in accordance with IEC 61869-1&3, with one (1) secondary winding with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0{,}11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation & synchronization with appropriate rated output.	1set (for each section)
		Three phases, three pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT) for bus-bar section III, all in accordance with IEC 61869-1&3, with one (1) secondary winding with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0{,}11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation & synchronization with appropriate rated output.	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102 in bus-bar section I, II and III (Bus coupler and Bus Riser Panels)	2 sets
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
C1.1.6	Bus-Section Cubicle (For RO NORTH SWG)	33 kV Bus-Section Cubicle/Panel with the following installed equipment:	1 set
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section I, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 5P20, minimum rated output of 15 VA for over-current protection, earth fault protection, CB failure protection. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section II, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics:	3 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	
		Three phases, three pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT) for bus-bar section I & II, all in accordance with IEC 61869-1&3, with one (1) secondary winding with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation & synchronization with appropriate rated output.	2 sets
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102 in bus-bar section I and II (Bus coupler and Bus Riser Panels)	2 sets
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
C1.1.7	Bus-Section Cubicle (for RO SOUTH SWGR)	33 kV Bus-Section Cubicle/Panel with the following installed equipment:	1 set
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section I, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 5P20, minimum rated output of 15 VA for over-current protection, earth fault protection, CB failure protection. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section II, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets
		Three phases, three pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT) for bus-bar section I & II, all in accordance with IEC 61869-1&3, with one (1) secondary winding with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0{,}11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation & synchronization with appropriate rated output.	2 sets
		– Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102 in bus-bar section I and II (Bus coupler and Bus Riser Panels)	2 sets
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions.	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C1.2	**33 kV Control, Protection & Metering Equipment**	**33 kV Control, Protection & Metering equipment, comprising of the following panels, equipment & devices:**	
C1.2.1	Control & Protection Panel for 33 kV Cable Feeder Cubicle	Control & Protection Panel for 33 kV Cable Feeder Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing switches and position indication for CB in "open" and "close" positions with buzzer to indicate discrepancy conditions, – Lockable control selector switch ("Remote/Supervisory"), – Lockable selector switch ("Off/Synchro") with indicating lamp for OFF position, – Digital multi-function meter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare). Alarms list shall be decided during detailed engineering stage. – Auxiliary relays for supervisory control of the CB (50 V DC), – Line Differential Protection relay. – Overcurrent protection relay with Earth fault protection, Circuit breaker failure protection. with synchronizing and Synchro-check feature.	16 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Trip circuit supervision relay, – Self-reset trip relay, – Transducers (Programmable Transducers with multi outputs) for supervisory indications as follows: - 3 phase current transducer and three-phase voltage transducer for NEPCO NCC, - 3 phase current transducer and three-phase voltage transducer for another center, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C1.2.2	Differential Protection Relay	Line Differential Protection Relay, same Type and Order Number for the Relay mentioned in C1.2.1. **(this item is loose material; the contractor shall only supply this item. These relays will be installed in the remote end by another contractor).** - any requirements for the connection and completion of Line Differential Protection (fiber optic cable, patch cords, splicing, cables, cables works, connection …etc) are the Contractor scope.	13 sets
C1.2.3	Control & Protection Panel for 33 kV Capacitor Bank Cubicle	Control & Protection Panel for 33 kV Capacitor Bank Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions, – Lockable Control selector switch ("Remote/Supervisory"),	7 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Operation counter with reset button, – Digital Multi-function meter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), (24 window annunciator shall be considered. Alarms list shall be decided during detailed engineering) – Auxiliary relays for supervisory control of the CB (50 V DC), – Overcurrent protection relay, with Earth fault protection, Overload protection, Circuit breaker failure protection. – Two-stage current unbalance protection relay, with Over-voltage & under-voltage protection – Ammeter with suitable scale for current unbalance, – Trip circuit supervision relay, – self-reset trip relay, – Current transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C1.2.4	Power Factor Controller	– Reactive Power Control Unit with external voltmeter and cosϕ meter, including facilities specified for input signals such as voltage selection scheme. – Lockable selector switch ("Automatic/Manual")	7 sets
C1.2.5	Control & Protection Panel for 33 kV Transformer Cubicle	Control & Protection Panel for 33 kV Transformer Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing	7 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions. – Lockable control selector switch ("Remote/Supervisory"), – Lockable selector switch ("Off/Synchro") with indicating lamp for OFF position, – Digital Multi-function Meter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), Alarms list shall be decided during detailed engineering stage. – Auxiliary relays for supervisory control of the CB (50 V DC). – High Impedance LV Restricted Earth Fault (REF) protection relay. – Directional overcurrent protection relay with Earth fault protection, Circuit breaker failure protection with synchronizing and Synchro-check feature, – Trip circuit supervision relay, – Electrical / hand reset trip relay. – Transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C1.2.6	Control & Protection Panel for 33 kV Bus Section Cubicle	Control & Protection Panel for 33 kV Bus Section Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing	4 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions, – Lockable Control selector switch ("Remote/Supervisory"), – Lockable selector switch ("Off/Synchro") with indicating lamp for off position, – Two Programmable Digital Ammeter and Voltmeter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare) Alarms list shall be decided during detailed engineering stage. – Auxiliary relays for supervisory control of the CB (50 V DC), – Overcurrent protection relay with Earth fault protection, Circuit breaker failure protection with synchronizing and Synchro-check feature. – Two-stage stand-by earth fault protection relay. – Trip circuit supervision relay, – Self-reset trip relay, – Transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C1.2.7	33 kV High Impedance Busbar Protection Panel (FOR IPS & BPS1 SWG)	33 kV High Impedance Busbar Protection Panel (comprising of two panels) for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Four (4) High Impedance Busbar protection relays for Main 1, main 2, main3 & Check Zones,	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Hand/Electrical reset trip relays for tripping the required circuits (1 trip relay for each circuit + 2 trip relays for Bus Section + 4 spare trip relays), – Any necessary test blocks for testing the Busbar protection relays and any alarm relays necessary for remote alarms and indications, – Isolation switches (In & Out of service) for each High Impedance Busbar protection relay with indicating lamps for In & out of service status. – Isolation switches (In & Out of service) to isolate BREAKER FAILURE stage 2 for each zone with indication lamps. – Signaling lamps for each Zone (i.e., Busbar protection operated for each Zone, Busbar protection fail for each Zone, DC healthy, Busbar protection in/out of service for each zone…), – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), – Four (4) CT supervision relays, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme. The panel shall be equipped with four (4) spare (future) circuits, three circuits at each side of the busbar (trip relays, test blocks, open short link.etc.).	
C1.2.8	33 kV High Impedance Busbar Protection Panel (FOR RO NORTH) & (FOR RO SOUTH)	33 kV High Impedance Busbar Protection Panel (comprising of two panels) for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Three (3) High Impedance Busbar protection relays for Main 1, main 2 & Check Zones,	2 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Hand/Electrical reset trip relays for tripping the required circuits (1 trip relay for each circuit + 2 trip relays for Bus Section + 4 spare trip relays), – Any necessary test blocks for testing the Busbar protection relays and any alarm relays necessary for remote alarms and indications, – Isolation switches (In & Out of service) for each High Impedance Busbar protection relay with indicating lamps for In & out of service status. – Isolation switches (In & Out of service) to isolate BREAKER FAILURE stage 2 for each zone with indication lamps. – Signaling lamps for each Zone (i.e., Busbar protection operated for each Zone, Busbar protection fail for each Zone, DC healthy, Busbar protection in/out of service for each zone…), – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), – Three (3) CT supervision relays, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme. The panel shall be equipped with four (4) spare (future) circuits, three circuits at each side of the busbar (trip relays, test blocks, open short link.etc.).	
C1.2.9	Supervisory Control & Telemetering Marshalling Cabinets	Supervisory Control & Telemetering Marshalling Cabinets AT LEAST (2) equipped for the following: – Sixteen (16) 33 kV feeder circuits, – Seven (7) 33 kV capacitor bank circuits, – Seven (7) 33 kV transformer circuits, – Four (4) 33 kV bus section circuit, – six (6) 33 kV spare (future) feeder circuits, – three (3) 33 kV spare (future) transformer circuit,	2 sets

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
C1.2.10	Alarm and Control Station Desk	Alarm and Control Station Desk in 33KV control room for indoor installation, completely wired, equipped with the following equipment and devices: - Annunciator with accept, reset and lamp test push buttons with station alarms according to Contractor's Design (with at least 20% spare), - Selector switch for "Substation unattended/Substation attended". The selector switch shall disconnect all audible alarms when in the "Unattended" position. Two (2) pairs of potential free contacts, one pair arranged to close in the "Attended" position and the other pair "Unattended position", shall be wired to the remote control and supervisory marshalling cabinet. A further set of two (2) pairs of contacts (closed with the switch in the "Attended" position) shall be provided as well, - For accept / reset command for acceptable and cancellation of alarms should be controllable from NCC. - Common push button to accept all alarms for all annunciators. - Common push button to reset all alarms for all annunciators. - three differentiated audible alarms for trip signal, non-trip signals, and discrepancy alarms. - Temperature and humidity indicator (0-10 mA DC) and range scale for temperature (-20 ºC ÷ 60 ºC) and for humidity (0 ÷ 100%). A suitable padded, swivel type office chair shall be provided with the work station control desk.	2 sets
C1.3	**33 kV Capacitor Banks with pertaining equipment**	**33 kV Capacitor Bank with rated capacity of 10 MVAr, with the following equipment for each Capacitor Bank** **Connect on the loading side**	**7 sets**
C1.3.1		33 kV Capacitor Bank with rated capacity of 10 MVAr, consisting of adequate number of capacitor units which	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		shall be internally fused, for operating voltage of 34 kV, with ungrounded double star configuration, mounted on adequate insulated racks and post insulators, complete with internal fuses and all auxiliary equipment, all in accordance with IEC 60871. - Capacitor bank: 10 MVAR (at 34kV). - System Nominal voltage : 33 kV - System highest voltage: 36 kV - System operating voltage: 34 kV - Frequency: 50 Hz - Standard IEC. 60871. - Connection: Double Star ungrounded with each phase of each star should consist of adequate no of units in parallel and series. - Location of Connection : 33 kV BB. - Installation : The capacitor units are to be indoor type, mounted on and solidly bonded to steel or aluminum racks mounted on insulators fixed on a concrete base. Installation is to be completed with all necessary interconnecting conductors, insulators, bushings, clamps, structures, and earth connection.	
C1.3.2		Single-pole, metal-oxide, gapless type Surge Arrester (SA) suitable for use with above specified Capacitor Bank, complete with supporting steel structure and surge counter, all in accordance with IEC 60099-4, with rated characteristics according to the Contractors Design.	3 sets
C1.3.3		Series (Current Limiting) Reactor suitable for use with above specified Capacitor Bank, for 31.5 kA/3 s rated short-time (3 s) withstand current, all-in accordance with IEC 60076-6, (calculation to be submitted) with rated characteristics according to the Contractors Design.	3 sets
C1.3.4		Single-phase, cast in epoxy resin Current Transformer (CT) for current unbalance protection and instruments, installed between two neutrals of the double star, all in accordance with IEC 61869-1&2, with rated characteristics according to the Contractors Design.	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
C1.3.5		Connecting material specially designed for capacitor banks, such as rigid and flexible conductors, post insulators, steel supports, connectors, clamps (bi-metal where necessary), fittings, etc., necessary to complete the connection of 33 kV capacitor cable terminations with capacitor banks.	1 set
C2: 400V AC Equipment for Substation AAWDCP 400/132/11 kV – New substation & 33KV SWG bulding1 & 2			
C2.1	400V LVAC	**400 V AC Equipment, comprising of the following equipment**	1 SET
	400 V AC Distribution Board/Switchgear	400VAC distribution Board/Switchgear	
		400 V AC Distribution Board/Switchgear, metalclad, free-standing type, for indoor installation with IP41 degree of mechanical protection, with two (2) busbar sections for suitable rated current and for 40 kA rated short-time (1 s) withstand current, completely wired, with alarm fascia/display, with all cable glands for cables entering from the bottom side, with interlocking specified in Particular Technical Specifications for and shown on the Tender Drawing , with the following installed equipment:	1 set
		Automatic Transfer Switch (ATS) with all necessary switching and control equipment (incoming supply automatic changeover contactor mechanical and electrical interlock) for quickly and reliably switching between power supply sources from three (3) Earthing & Auxiliary transformers (132/33KV TR2 & 132/33KV TR4) and (132/33KV TR6).	1 set
		Main incoming Circuit Breaker for main incoming power supplies from the Earthing & Auxiliary transformers, for suitable rated current. Main incoming Circuit Breakers shall be mutually interlocked and interlocked with Stand-by incoming Circuit Breaker & Bus section Circuit Breaker as per Tender technical specification and Drawing.	3 sets
		Stand-by incoming Circuit Breaker for stand-by incoming power supply from diesel generator for suitable rated current, interlocked with Main incoming Circuit Breaker	1 set

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		& Bus section Circuit Breaker as per Tender technical specification and Drawing.	
		Bus section Circuit Breaker for suitable rated current, interlocked with Main incoming Circuit Breakers & Stand-by incoming Circuit Breaker as per Tender technical specification and Drawing.	1 set
		Incoming ammeter scaled 0 ÷ xx A with phase selector switch.	3 sets
		Bus section ammeter scaled 0 ÷ xx A with phase selector switch	1 set
		Incoming voltmeter scaled 0 ÷ 420 V with selector switch.	3 sets.
		Incoming 3-phase kWh meter.	3 sets
		Moulded Case Circuit Breakers (MCCBs) of adequate ratings for all substation equipment/consumers according to the Contractors Design.	1 set
		Miniature Circuit Breakers (MCBs) of adequate ratings for all substation equipment/consumers according to the Contractors Design.	1 set
		One (1) spare MCCB of each type/rating.	1 set
		One (1) spare MCB of each type/rating.	1 set
		Note: the rated current for the LVAC SWG shall be determined by the calculations and design of the contractor.	
C2.2	Standby Diesel Generator for 33KV SWG building1 & 2	**Automatic, Mains Failure, Standby Diesel Generator** Complete with all fuel filling facilities, storage tanks, generator circuit breaker, control board, batteries, connections to the LV Services Board, also it shall be under an appropriate enclosure with it is auxiliary equipment keeping protected from the direct sun. Installation will be safe from accidental trips. Generator is to be installed in the dedicated building; however, noise levels will be below those defined OSHA standards.	**1 set**

A/C -AAWDCP 400/132/33KV SUBSTATION (33KV SWG'S)			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		Note: the rated power for the Diesel Generator (Not less than 200kVA) shall be determined by the contractor according to actual SS load, with spare of 20%.	

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
C3: 33KV MAIN SWITCHGEAR CONNECT WITH 400 MVA ATR			
C3.1	**33 kV Switchgear**	**33 kV Air-Insulated Switchgear (AIS), Metal Clad type (LSC 2B, IAC AFLR, PM), for 36 kV (70/ 170 kV) rated voltage, for 2500 A rated current and for 31.5 kA rated short-time (3 s) withstand current, for indoor installation with IP41 degree of mechanical protection, all in accordance with IEC 62271-200, comprising of the following Cubicles/Panels:**	
C3.1.1	Capacitor Bank Cubicle	33 kV Capacitor Bank Cubicle/Panel with the following installed equipment per Cubicle:	4 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), SF6 type, 33kV Circuit Breaker (CB), specially designed for capacitor bank application, for 1250 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with four (4) cores with the following characteristics: – I Core: Rated transformation ratio: 600/1 A, accuracy class 5P20, minimum rated output of 15 VA for over-current protection, earth-fault protection and CBF. – II Core: Rated transformation ratio: 600/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – III Core: Rated transformation ratio: 2500/1 A, accuracy class PX for Busbar zone Main protection, – IV Core: Rated transformation ratio: 2500/1 A, accuracy class PX for Busbar zone Check protection.	3 sets
		Single-phase, single pole insulated, cast in epoxy resin, fixed type Voltage Transformer (VT), without primary fuses, all in accordance with IEC 61869-1&3, with two (2) secondary windings with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 3P for protection with appropriate rated output.	3 sets

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– II Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation with appropriate rated output.	
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
		– Cable compartment suitable for connection of 33 kV cables with copper conductor and XLPE insulation with capacitor banks. ***Note:*** The exact characteristics of incoming 33 kV cables (conductor cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set
C3.1.2	Reactor Cubicle	33 kV reactor Cubicle/Panel with the following installed equipment per Cubicle:	2 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), **SF6 type or** vacuum **type**, 33kV Circuit Breaker (CB), specially designed for capacitor bank application, for 1250 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with five (5) cores with the following characteristics: – I Core: Rated transformation ratio: 600/1 A, accuracy class PX, for circulating. – II Core: Rated transformation ratio: 600/1 A, accuracy class 5P20 with minimum rated output 15 VA, for over current, earth fault & CBF. – III Core: Rated transformation ratio: 600/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – IV Core: Rated transformation ratio: 2500/1 A, accuracy class PX for Busbar zone Main protection, – V Core: Rated transformation ratio: 2500/1 A, accuracy class PX for Busbar zone Check protection.	3 sets
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
		– Cable compartment suitable for connection of 33 kV cables with copper conductor and XLPE insulation with capacitor banks. – ***Note:*** The exact characteristics of incoming 33 kV cables (conductor cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
C3.1.3	Incomer Transformer Cubicle	33 kV Transformer Cubicle/Panel with the following installed equipment per Cubicle:	2 sets
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s kA rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set
		Single-phase, cast in epoxy resin Current Transformer (CT) all in accordance with IEC 61869-1&2, with five (5) cores with the following characteristics: – I Core: Rated transformation ratio: 2000/1000/1 A, accuracy class PX for biased differential protection. – II Core: Rated transformation ratio: 2000/1000/1 A, accuracy class 5P20, minimum rated output of 15 VA for directional over current, directional earth fault,CBF. – III Core: Rated transformation ratio: 2000/1000/1 A, accuracy class 0.5, minimum rated output of 10 VA INST. – IV Core: Rated transformation ratio: 2500/1 A, accuracy class PX for Busbar zone Main protection, – V Core: Rated transformation ratio: 2500/1 A, accuracy class PX for Busbar zone Check protection.	3 sets
		Single-phase, single pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT), all in accordance with IEC 61869-1&3, with two (2) secondary windings with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 3P for directional over-current protection & instrumentation with appropriate rated output.	3 sets

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– II Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0,11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for INST. with appropriate rated output.	
		Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102.	1 set
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
		– Cable compartment suitable for connection of 33 kV cables with copper conductor and XLPE insulation with LV side of main transformer. ***Note:*** The exact characteristics of incoming 33 kV cables (conductor cross-sectional area, number of single-core cables per phase, etc.) shall be determined in Engineering/Design stage.	1 set
C3.1.4	Bus-Section Cubicle	33 kV Bus-Section Cubicle/Panel with the following installed equipment:	1 set
		Three-phase busbars for 2500 A rated current.	1 set
		Three-pole, withdrawable (floor-rolling), vacuum type, 33 kV Circuit Breaker (CB), for 2500 A rated current and for 31.5 kA/3 s rated breaking current, complete with motor wound-spring operating mechanism, shunt closing & opening coils, auxiliary equipment, all in accordance with IEC 62271-100.	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section I, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 5P20, minimum rated output of 15 VA for over-current protection, earth fault protection, CB failure protection. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets IN EACH SECTION
		Single-phase, cast in epoxy resin Current Transformer (CT) for bus-section II, all in accordance with IEC 61869-1&2, with two (2) cores with the following characteristics: – I Core: Rated transformation ratio: 2500/1250/1 A, accuracy class 0.5, minimum rated output of 10 VA for instrumentation. – II Core: Rated transformation ratio: 2500/1250/1A, accuracy class PX for Busbar zone Main protection.	3 sets IN EACH SECTION
		– Three phases, three pole insulated, cast in epoxy resin, primary fused, withdrawable type Voltage Transformer (VT) for bus-bar section I & II, all in accordance with IEC 61869-1&3, with one (1) secondary winding with the following characteristics: – I Winding: Rated transformation ratio: $\frac{33}{\sqrt{3}}/\frac{0{,}11}{\sqrt{3}}$ kV/kV, accuracy class 0.5 for instrumentation & synchronization with appropriate rated output.	2 sets
		– Three-pole Earthing Switch (ES) all in accordance with IEC 62271-102 in bus-bar section I and II (Bus coupler and Bus Riser Panels). Or – earth truck facility considering any required interlocks	2 sets

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		LV compartment, completely wired, equipped with the following equipment and devices: – Mimic diagram with spring return lockable control switch for circuit breaker (ON/Normal/OFF), indicators for earthing switches and position indication for CB in "open" and "close", "Service" and "Test" positions. – Lockable control selector switch ("Local/Remote"), All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	1 set
	Interlock: Bus section will always prevent putting in parallel operation two auto transformers.		
C3.2	**33 kV Control, Protection & Metering Equipment**	**33 kV Control, Protection & Metering equipment, comprising of the following panels, equipment & devices:**	
C3.2.1	Control & Protection Panel for 33 kV Capacitor Bank Cubicle	Control & Protection Panel for 33 kV Capacitor Bank Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions, – Lockable Control selector switch ("Remote/Supervisory"), – Operation counter with reset button, – Digital Multi-function meter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), (24 window annunciator shall	4 sets

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		be considered. Alarms list shall be decided during detailed engineering) – Auxiliary relays for supervisory control of the CB (50 V DC), – Overcurrent protection relay, with Earth fault protection, Overload protection, Circuit breaker failure protection. – Two-stage current unbalance protection relay, with Over-voltage & under-voltage protection – Ammeter with suitable scale for current unbalance, – Trip circuit supervision relay, – self-reset trip relay, – Current transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C3.2.2	Power Factor Controller	– Reactive Power Control Unit with external voltmeter and cosϕ meter, including facilities specified for input signals such as voltage selection scheme. – Lockable selector switch ("Automatic/Manual")	2 sets
C3.2.3	Control & Protection Panel for 33 kV reactor Cubicle	Control & Protection Panel for 33 kV reactor Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions, – Lockable Control selector switch ("Remote/Supervisory"),	2 sets

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Digital Multi-function meter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), (24 window annunciator shall be considered. Alarms list shall be decided during detailed engineering) – Auxiliary relays for supervisory control of the CB (50 V DC), – High impedance differential protection relay. – Overcurrent protection relay, with Earth fault protection, Overload protection, Circuit breaker failure protection. – Trip circuit supervision relay, – Electrical / hand reset trip relay. – Current transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C3.2.4	Control & Protection Panel for 33 kV Transformer Cubicle	Control & Protection Panel for 33 kV Transformer Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions. – Lockable control selector switch ("Remote/Supervisory"), – Lockable selector switch ("Off/Synchro") with indicating lamp for OFF position, – Digital Multi-function Meter,	2 sets

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), Alarms list shall be decided during detailed engineering stage. – Auxiliary relays for supervisory control of the CB (50 V DC). – Directional overcurrent protection relay with Earth fault protection, Circuit breaker failure protection. – Synchro-check relay – Trip circuit supervision relay, – Electrical / hand reset trip relay. – Transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C3.2.5	Control & Protection Panel for 33 kV Bus Section Cubicle	Control & Protection Panel for 33 kV Bus Section Cubicle for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – Mimic diagram with discrepancy-type control switch for circuit breaker, discrepancy indicators for earthing switches and position indication for CB in "Open" and "Close" positions with buzzer to indicate discrepancy conditions, – Lockable Control selector switch ("Remote/Supervisory"), – Lockable selector switch ("Off/Synchro") with indicating lamp for off position, – Two Programmable Digital Ammeter and Voltmeter, – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		(with at least 20% spare) Alarms list shall be decided during detailed engineering stage. – Auxiliary relays for supervisory control of the CB (50 V DC), – Overcurrent protection relay with Earth fault protection, Circuit breaker failure protection with synchronizing and Synchro-check feature. – Trip circuit supervision relay, – Self-reset trip relay, – Transducers for supervisory indications, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme.	
C3.2.6	33 kV High Impedance Busbar Protection Panel	33 kV High Impedance Busbar Protection Panel (comprising of two panels) for indoor installation with IP41 degree of mechanical protection, completely wired, with the following equipment and devices: – three (3) High Impedance Busbar protection relays for Main 1, main 2 & Check Zones, – Hand/Electrical reset trip relays for tripping the required circuits (1 trip relay for each circuit + 2 trip relays for Bus Section + 4 spare trip relays), – Any necessary test blocks for testing the Busbar protection relays and any alarm relays necessary for remote alarms and indications, – Isolation switches (In & Out of service) for each High Impedance Busbar protection relay with indicating lamps for In & out of service status. – Isolation switches (In & Out of service) to isolate BREAKER FAILURE stage 2 for each zone with indication lamps.	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		– Signaling lamps for each Zone (i.e., Busbar protection operated for each Zone, Busbar protection fail for each Zone, DC healthy, Busbar protection in/out of service for each zone…), – Annunciator with accept, reset and lamp test push buttons with alarms according to Contractor's Design (with at least 20% spare), – Three (3) CT supervision relays, All necessary switches, MCBs, auxiliary relays, interposing transformers, transducers, links (fuse block: link in fuse holder), terminals, labels, test blocks for main relays, wiring, etc. to complete the scheme. The panel shall be equipped with four (4) spare (future) circuits, three circuits at each side of the busbar (trip relays, test blocks, open short link.etc.).	
C3.2.7	Supervisory Control & Telemetering Marshalling Cabinets	Supervisory Control & Telemetering Marshalling Cabinets (comprising two cabinets) equipped for the following: – Four (4) 33 kV capacitor bank circuits, – two (2) 33 kV reactor circuits, – three (3) 33 kV transformer circuits, – one (1) 33 kV bus section circuit, – Four (4) 33 kV spare (future) feeder circuits,	1 set
C3.2.8	Alarm and Control Station Desk	Alarm and Control Station Desk in 33KV control room for indoor installation, completely wired, equipped with the following equipment and devices: - Annunciator with accept, reset and lamp test push buttons with station alarms according to Contractor's Design (with at least 20% spare), - Selector switch for "Substation unattended/Substation attended". The selector switch shall disconnect all audible alarms when in the "Unattended" position. Two (2) pairs of potential free contacts, one pair arranged to close in the "Attended" position and the other pair "Unattended position", shall be wired to the remote control and supervisory marshalling cabinet. A further set of two (2) pairs of	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		contacts (closed with the switch in the "Attended" position) shall be provided as well, - For accept / reset command for acceptable and cancellation of alarms should be controllable from NCC. - Common push button to accept all alarms for all annunciators. - Common push button to reset all alarms for all annunciators. - three differentiated audible alarms for trip signal, non-trip signals, and discrepancy alarms. - Temperature and humidity indicator (0-10 mA DC) and range scale for temperature (-20 ºC ÷ 60 ºC) and for humidity (0 ÷ 100%). A suitable padded, swivel type office chair shall be provided with the work station control desk.	
C3.3	**33 kV Capacitor Banks with pertaining equipment**	**33 kV Capacitor Bank with rated capacity of 20 MVAr, with the following equipment for each Capacitor Bank**	**4 sets**
C3.3.1		33 kV Capacitor Bank with rated capacity of 20 MVAr, consisting of adequate number of capacitor units which shall be internally fused, for operating voltage of 34 kV, with ungrounded double star configuration, mounted on adequate insulated racks and post insulators, complete with internal fuses and all auxiliary equipment, all in accordance with IEC 60871. **- Capacitor bank: 20 MVAR (at 34kV).** **- System Nominal voltage : 33 kV** **- System highest voltage: 36 kV** **- System operating voltage: 34 kV** **- Frequency: 50 Hz** **- Standard IEC. 60871.** **- Connection: Double Star ungrounded with each phase of each star should consist of adequate no of units in parallel and series.** **- Location of Connection : 33 kV BB.**	1 set

A/C AAWDCP 33KV SWG'S WITH 400 KV TR			
List No.	**Name of Goods**	**Brief Description**	**Quantity**
		- Installation : The capacitor units are to be indoor type, mounted on and solidly bonded to steel or aluminum racks mounted on insulators fixed on a concrete base. **Installation is to be completed with all necessary interconnecting conductors, insulators, bushings, clamps, structures, and earth connection.**	
C3.3.2		Single-pole, metal-oxide, gapless type Surge Arrester (SA) suitable for use with above specified Capacitor Bank, complete with supporting steel structure and surge counter, all in accordance with IEC 60099-4, with rated characteristics according to the Contractors Design.	3 sets
C3.3.3		Series (Current Limiting) Reactor suitable for use with above specified Capacitor Bank, for 31.5 kA/3 s rated short-time (3 s) withstand current, all-in accordance with IEC 60076-6, (calculation to be submitted) with rated characteristics according to the Contractors Design.	3 sets
C3.3.4		Single-phase, cast in epoxy resin Current Transformer (CT) for current unbalance protection and instruments, installed between two neutrals of the double star, all in accordance with IEC 61869-1&2, with rated characteristics according to the Contractors Design.	1 set
C3.3.5		Connecting material specially designed for capacitor banks, such as rigid and flexible conductors, post insulators, steel supports, connectors, clamps (bi-metal where necessary), fittings, etc., necessary to complete the connection of 33 kV capacitor cable terminations with capacitor banks.	1 set