CEYLON ELECTRICITY BOARD
SRI LANKA

SUPPORTING ELECTRICITY SUPPLY RELIABILITY IMPROVEMENT PROJECT

(ADB LOAN NO: 3409-SRI)

PACKAGE 7 - LOT A3

Procurement of Plant

Design, Supply, and Installation

Single-Stage: Two-Envelope

Bidding Procedure

BIDDING DOCUMENT

for

Procurement

of

Installation of:

124Mvar Breaker Switched Capacitor Banks in Colombo City Grid Substations and

Replacing the Detuned Breaker Switched Capacitor Banks at Thulhiriya Grid Substation

VOLUME 4 of 8

PART II REQUIREMENTS

Section 6 - Employer's Requirements: Part A-Scope of Works

Issued on: 11th June 2020
Invitation for Bids No.: CEB/AGM/PRO/2019/IFB/SESRIP-P7 Lot A3
ICB No.: CEB/AGM/PRO/2019/ICB/SESRIP-P7 Lot A3
Employer: Ceylon Electricity Board
Country: Sri Lanka

Projects Division
Ceylon Electricity Board,
P.O. Box 540, Colombo 02
Sri Lanka
Document – Revision C

Preface

This Bidding Document for Procurement of Plant – Design, Supply, and Installation, has been prepared by Ceylon Electricity Board and is based on the Standard Bidding Document for Procurement of Plant – Design, Supply, and Installation (SBD Plant) issued by the Asian Development Bank dated December 2016.

ADB's SBD Plant has the structure and the provisions of the Master Procurement Document entitled "Procurement of Plant – Design, Supply, and Installation", prepared by multilateral development banks and other public international financial institutions except where ADB-specific considerations have required a change.

Table of Contents - Summary Description

VOLUME 1 OF 8

PART I BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB) ---------- 1-1

This Section specifies the procedures by Bidders in the preparation and submission of their Bids following a Single-Stage, Two-Envelope bidding procedure. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Section 2 - Bid Data Sheet (BDS) ---------- 2-1

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

Section 3 - Evaluation and Qualification Criteria (EQC) ---------- 3-1

This Section contains the bid evaluation criteria to determine the lowest evaluated bid and lists the necessary qualifications of Bidders.

VOLUME 2 OF 8

PART I BIDDING PROCEDURES

Section 4 - Bidding Forms (BDF) ---------- 4A-1

Part A-Price Bid
This Section contains the forms which are to be completed by the Bidder and submitted as part of its Bid.

VOLUME 3 OF 8

PART I BIDDING PROCEDURES

Section 4 - Bidding Forms (BDF) ---------- 4B-1

Part B-Technical Bid
This Section contains the forms which are to be completed by the Bidder and submitted as part of its Bid.

Section 5 - Eligible Countries (ELC) ---------- 5-1

This Section contains the list of eligible countries.

VOLUME 4 OF 8

PART II REQUIREMENTS

Section 6 - Employer's Requirements (ERQ) ---------- 6A-1

Part A-Scope of Works

VOLUME 5 OF 8

PART II REQUIREMENTS

Section 6 - Employer's Requirements (ERQ) ---------- 6B-1

Part B-Technical Specification

VOLUME 6 OF 8

PART II REQUIREMENTS

Section 6 - Employer's Requirements (ERQ) ---------- 6C-1

Part C-Drawings

VOLUME 7 OF 8

PART II REQUIREMENTS

Section 6 - Employer's Requirements (ERQ) ---------- 6D-1

Part D-Supplementary Information

Section 6 - Employer's Requirements (ERQ) ---------- 6D-1

Part E-Bank Guarantees and Certificates, Change Orders

VOLUME 8 OF 8

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) ---------- 7-1

This Section contains the general clauses to be applied in all contracts. These Conditions are subject to the variations and additions set out in Section 8 (Special Conditions of Contract).

Section 8 - Special Conditions of Contract (SCC) ---------- 8-1

This Section contains provisions that are specific to each contract and that modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC. The clause number of the SCC is the corresponding clause number of the GCC.

Section 9 - Contract Forms (COF) ---------- 9-1

This Section contains forms, which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

TABLE OF CONTENTS
SCOPE OF WORKS

1. SCOPE OF WORKS 5

1.1 General Discription 5
1.1.1 Installation of Breaker Switched Capacitor Banks At Substation A 5
1.1.2 Installation of Breaker Switched Capacitor Banks At Substation B 5
1.1.3 Installation of Breaker Switched Capacitor Banks At Substation I 6
1.1.4 Installation of Breaker Switched Capacitor Banks At Substation L1 and L2 6
1.1.5 Installation of Breaker Switched Capacitor Banks At Substation M 7
1.1.6 Installation of Breaker Switched Capacitor Banks At Substation N 7
1.1.7 Installation of Breaker Switched Capacitor Banks At Thulhiriya Grid Substation 7
1.1.8 Terminal Points 8
1.1.9 Site Environmental Conditions 11
1.1.10 Electricity, Water, Gas and Other Services 12
1.1.11 Adherance To The Environmental Mitigation Measures 12

1.2 Plant & Equipment Including Mandatory Spare Parts 13
1.2.1 Substation A 13
1.2.2 Substation B 18
1.2.3 Substation I 22
1.2.4 Substation L1 and L2 27
1.2.5 Substation M 31
1.2.6 Substation N 35
1.2.7 Thilhiriya Grid Substation 39

1.3 Civil Works, Installation, Other Services and training 42
1.3.1 Civil Works 42
1.3.2 Installation 48
1.3.3 Other services 49
1.3.4 Training 50

1. SCOPE OF WORKS

1.1 GENERAL DISCRIPTION

The scope of works include design, construction and commissioning of Breaker Switched Capacitor banks at 11kV level, in Colombo City substations namely Substation A, B, I, L(L1 and L2), M , N and 33kV level at Thulhiriya Substation.

For Colombo City Substations, Indoor type Metal Enclosed Capacitor Banks were selected due to the limitation of space. Two types of housings were selected considering the space availability and difficulty of building construction or extension. The capacitor banks installation in Substation A, I, M and N were design with prefabricated housing, where substation L (L1 and L2) were design with building extension to install indoor type capacitor bank. The construction work of substation B is cover under a different project and its control building and 11kV switch gears are design with provision for indoor capacitor bank.

The manufacturer of prefabricated housing shall comply the minimum requirement of manufacturing under clause 1.5, chapter 1 of Technical Specification.

General description of each substation is as follows.

1.1.1 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT SUBSTATION A

Installation of Breaker Switched Capacitor Banks in substation A as follows.

1. 5 x 4Mvar Breaker Switched Capacitor (filter) Bank (indoor type).
2. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bank.
3. Modifications to Battery banks, charger, distribution board and LVAC Distribution system etc.
4. Modification to SCADA Gateway System.
5. Modifications to Substation Automation System as per the scope.
6. Power Quality Monitoring System
7. Power and Control cables including terminations.
8. Electrical, Civil and Mechanical works required for substation, control building and supply and installation of prefabricated housing.
9. Spare parts.

1.1.2 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT SUBSTATION B

Installation of Breaker Switched Capacitor Banks in substation B as follows.

1. 3 x 4Mvar Breaker Switched Capacitor (filter) Bank (indoor type).
2. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bank.

3. Modifications to DC and LVAC Distribution system etc.
4. Modification to SCADA Gateway System.
5. Modifications to Substation Automation System as per the scope.
6. Power Quality Monitoring System
7. Power and Control cables including terminations.
8. Electrical, Civil and Mechanical works required for substation and control building.
9. Spare parts.

1.1.3 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT SUBSTATION I

Installation of Breaker Switched Capacitor Banks in substation I as follows.

1. 5 x 4Mvar Breaker Switched Capacitor (filter) Bank (indoor type).
2. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bank.
3. Modifications/replacement to Battery banks, charger, distribution board and modification of LVAC Distribution system etc.
4. Modification to SCADA Gateway System.
5. Modifications to Substation Automation System as per the scope.
6. Power Quality Monitoring System
7. Power and Control cables including terminations.
8. Electrical, Civil and Mechanical works required for substation, control building and supply and installation of prefabricated housing.
9. Spare parts.

1.1.4 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT SUBSTATION L1 AND L2

Installation of Breaker Switched Capacitor Banks in substation L as follows.

1. Two 5 x 4Mvar Breaker Switched Capacitor (filter) Banks (indoor type) for substation L (L1 and L2).
2. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bays.
3. Modifications to DC and LVAC Distribution system etc.
4. Modification to SCADA Gateway System.
5. Modifications to Substation Automation System as per the scope.
6. Power and Control cables including terminations.
7. Electrical, Civil and Mechanical works required for extension of substation and control building.
8. Spare parts.

1.1.5 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT SUBSTATION M

Installation of Breaker Switched Capacitor Banks in substation M as follows.

1. 4 x 4Mvar Breaker Switched Capacitor (filter) Bank (indoor type).
2. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bays.
3. Modifications to DC and LVAC Distribution system etc.
4. Modification to SCADA Gateway System.
5. Modifications to Substation Automation System as per the scope.
6. Power and Control cables including terminations.
7. Electrical, Civil and Mechanical works required for substation, control building and supply and installation of prefabricated housing.
8. Spare parts.

1.1.6 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT SUBSTATION N

Installation of Breaker Switched Capacitor Banks in substation N as follows.

1. 4 x 4Mvar Breaker Switched Capacitor (filter) bank.
2. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bays.
3. Modifications to DC and LVAC Distribution system etc.
4. Modification to SCADA Gateway System.
5. Modifications to Substation Automation System as per the scope.
6. Power and Control cables including terminations.
7. Electrical, Civil and Mechanical works required for substation, control building and supply and installation of prefabricated housing.
8. Spare parts.

1.1.7 INSTALLATION OF BREAKER SWITCHED CAPACITOR BANKS AT THULHIRIYA GRID SUBSTATION

Installation of Breaker Switched Capacitor Banks in Thulhiriya Substation is as follows;

1. 2 x 5Mvar Breaker Switched Capacitor Bank.
2. Removal of the existing 33kV capacitor banks, structures and foundations. (possibility of using the existing capacitor units of capacitor bank shall be consider)
3. Control, Metering, Monitoring and Protection equipment for Breaker Switched Capacitor Bays.
4. Modifications to DC and LVAC Distribution system etc.
5. Modification to SCADA Gateway System.
6. Power Quality Monitoring System

7. Power and Control cables including terminations.
8. Electrical, Civil and Mechanical works required for substation and control building.
9. Spare parts.

1.1.8 TERMINAL POINTS

A. Substation A

The following shall be the contract terminal points: -

(a) 12kV GIS.

Connection of the capacitor bank to the spare bays in the existing GIS shall cover under this contract (ABB, ZX 1.2).

(b) Substation Automation System

Existing Substation Automation System shall be modified to incorporate the capacitor banks as per the scope (ABB Micro SCADA 9.4).

(c) Communication interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center and Colombo City Distribution Control Center (make and type).

(d) LVAC and DC supply

Existing LVAC, DC system and distribution system shall be modified according to the requirement.

B. Substation B

The following shall be the contract terminal points: -

(a) 12kV GIS.

Connection of the capacitor bank to the capacitor bank bays in the GIS shall cover under this contract (GMA12-31-08).

(b) Substation Automation System

Existing Substation Automation System shall be modified to incorporate the capacitor banks as per the scope (ABB Micro SCADA 9.4).

(c) Communication Interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center and Colombo City Distribution Control Center.

(d) LVAC and DC supply

Existing LVAC and DC distribution system shall be modified according to the requirement.

C. Substation I

The following shall be the contract terminal points: -

(a) 12kV GIS.

Connection of the capacitor bank to the spare bays in the existing GIS shall cover under this contract (ABB ZX1.2).

(b) Substation Automation System

Existing Substation Automation System shall be modified to incorporate the capacitor banks (ABB Micro SCADA 9.4).

(c) Communication Interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center and Colombo City Distribution Control Center.

(d) LVAC and DC supply

Existing LVAC, DC system and distribution system shall be modified according to the requirement.

D. Substation L1 and L2

The following shall be the contract terminal points: -

(a) 12kV GIS.

Connection of the capacitor bank to the spare bays in the existing GIS shall cover under this contract (GMA12-31-08).

(b) Substation Automation System

Existing Substation Automation System shall be modified to incorporate the capacitor banks (ABB Micro SCADA 9.4).

(c) Communication Interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center and Colombo City Distribution Control Center.

(d) LVAC and DC supply

Existing LVAC and DC distribution system shall be modified according to the requirement.

E. Substation M

The following shall be the contract terminal points: -

(a) 12kV GIS.

Connection of the capacitor bank to the spare bays in the existing GIS shall cover under this contract (GMA12-31-08).

(b) Substation Automation System

Existing Substation Automation System shall be modified to incorporate the capacitor banks (ABB Micro SCADA 9.4).

(c) Communication Interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center and Colombo City Distribution Control Center.

(d) LVAC and DC supply

Existing LVAC and DC distribution system shall be modified according to the requirement.

F. Substation N

The following shall be the contract terminal points: -

(a) 12kV GIS.

Connection of the capacitor bank to the spare bays in the existing GIS shall cover under this contract (GMA12-31-08).

(b) Substation Automation System

Existing Substation Automation System shall be modified to incorporate the capacitor banks (ABB Micro SCADA 9.4).

(c) Communication Interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center and Colombo City Distribution Control Center.

(d) LVAC and DC supply

Existing LVAC and DC distribution system shall be modified according to the requirement.

.

G. Thulhiriya Grid Substation

The following shall be the contract terminal points: -

(a) 33kV GIS.

Connection of the capacitor bank to the existing GIS Capacitor Bank bay shall cover under this contract (Alstom).

(b) Communication Interface

All Analog Measurements, Station Controls, Events and Alarms shall be made available as per IEC protocols for integration and configuration to the National System Control Center.

(c) LVAC and DC supply

Existing LVAC and DC distribution system shall be modified according to the requirement.

1.1.9 SITE ENVIRONMENTAL CONDITIONS

Colombo

Altitude of site above sea level not exceeding	m	100
Maximum ambient air temperature	^{0}C	40
Minimum ambient air temperature	^{0}C	14.2
Average ambient air temperature over 24 hours	^{0}C	28
Average yearly temperature	^{0}C	30
Relative humidity (24 hours)	%	82
Average annual rainfall	mm	2423.8
Maximum recorded rainfall for 24 hours	mm	493.7
Storms	Frequency of thunderstorms high	

Average isokeraunic level	90 days per annum
Pollution level for bushings and insulators	43.3mm/kV (USCD)
Atmospheric Corrosively Category	C5 (ISO 12944-2)

Note: All steel structures shall be painted according to the ISO 12944. The level of coating failure before the first major maintenance painting shall not be less than 15 years.

1.1.10 ELECTRICITY, WATER, GAS AND OTHER SERVICES

The Contractor shall at his expense, provide all electricity, water, gas and other services necessary to execute and complete the Works on site. Prevailing tariff and service connection procedure shall be applicable.

1.1.11 ADHERANCE TO THE ENVIRONMENTAL MITIGATION MEASURES

Bidders are requested to comply with the requirements stated in the Chapter 1, Clause 1.7of Section 6 Part B -Technical Specifications and also to the environmental safeguard measures described in the following documents attached in the section 6 Employers requirement Part D- Supplementary Information.

The said documents prepared in accordance with the governing acts and/or guidelines, which are particularly relevant to this project may be inspected and a copy obtained free of charge from the office of the Project Manager – SESRIP Package 7 Lot A3 at the following address.

Address: Office of Project Manager (SESRIP-P7-Lot A3)

Ceylon Electricity Board,

No. 25/1,

Butgamuwa Road, Rajagiriya

Sri Lanka

Telephone: *(+94) 11 288 9650*

Facsimile number: *(+94) 11 288 9763*

Electronic mail address: *nimaldgns.desilva@yahoo.com*

1.2 PLANT & EQUIPMENT INCLUDING MANDATORY SPARE PARTS

1.2.1 SUBSTATION A

Due to the limited space available at Substation A, a prefabricated housing shall be used to install all capacitor bank and incoming switch gears.

1.2.1.1 11KV INDOOR CAPACITOR BANK

1.2.1.1.1 02 Nos. of 11kV incomer units for two set of Capacitor Banks, each incomer unit comprising:-

1 No. - 1250A, 12kV three phase circuit breaker, design for breaking capacitive currents (or required rating shall be based on calculation) with motor operating mechanism

1 No. - 1250 A, 12 kV, 25kA three phase disconnector and earth switch with motor operating mechanism

3 Nos. - Single phase voltage transformers, ratio 11,000/√3:110/√3 V class 3P for under voltage and over voltage protection.

1.2.1.1.2 05 Nos. of 11 kV 4Mvar, Metal Enclosed Switched Capacitor Bank, each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor (filter).

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse.

3 Nos. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate.

1.2.1.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.1.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing substation battery systems with chargers and distribution switchboards, to be replace with this contract. The 110V DC system shall supply the following loads: -

(i) 145kV and 12kVswitchgear standing loads of control, protection and alarms including capacitor bank load.

(ii) UPS for computer supply.

(iii) Emergency building lighting of 1 kW loading for 8 hours.

(iv) SCADA and Communication system.

(iv) After supply of the above coincident loads for a period of 8hours, the battery shall be capable of two closing and two tripping operations of each circuit breaker within the substation.

1.2.1.4.1 110V Battery System comprising: -

2 Nos. - 110V NiCd battery banks with the minimum capacity of 300Ah (Actual capacity shall be calculate at detail design stage) in each.

2 Sets - Charging equipment with automatic switch-over function.

1 No. - Selector switch for Chargers 1 and 2.

1 Set - DC distribution board.

1 Set - miscellaneous items

Other circuits as may be required for the equipment.

1.2.1.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.1.4.1 Substation Automation System:-

Extension work of existing SAS at relevant grids will be carry out by Transmission Control and Protection Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and to be engineered to incorporate the existing ABB SAS system. The Fibre network including accessories like switches shall be provided and installed up to existing master switches of existing SAS.

(Bidders are strongly advised to study and quote the exact scope under this item and further clarification can be obtained at the pre bid meeting.)

1.2.1.4.2 Power Quality Analyzer

1No.	-	Power Quality Analysing System as per specification
1 Lot	-	Accessories to connect Current and Voltage Circuit of each transformer bay (11kV), all feeder bays (11kV), 132kV bus bar Voltage and breaker positions of each step unit of capacitor bank.

1.2.1.4.3 12 kV Protection & Control facilities: -

1.2.1.4.3.1 For 5 Nos. 12kV capacitor feeders bay each comprising with: -

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 11kV GIS bay protection configuration shall be modified, it shall be covered under this contract.

1.2.1.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.1.5.1 SCADA Gateways

SCADA Gateway –Substation A GSS

Modification work of existing gateway will be carried out by Transmission – Communications Branch of CEB.

License shall be provided by the contractor for the required number of data points for the modification work.

Modification of SCADA system in Colombo City Distribution Control Centre will be carried out by Colombo City Branch of CEB.

1.2.1.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.1.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires or lightning mast as necessary to accommodate modifications.

1.2.1.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.1.9. POWER AND CONTROL CABLES

1.2.1.9.1 12kV Power cables, joints and terminations

02 Lots 12 kV, Cu, XLPE insulated, aluminium wire armoured single core cables for connections between Capacitor bank and 12kV indoor switchgear.

04 Lots cable termination for above mentioned cable circuits to be supplied and terminated at capacitor banks and 12kV GIS bays.

1.2.1.9.2. All low voltage AC power cables and terminations

1.2.1.9.3. All DC power and control cables and terminations

1.2.1.9.4. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.1.9.5 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.1.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.1.11. MARSHALLING KIOSK

N/A

1.2.1.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.1.13. SPARE PARTS

All necessary Spare parts.

1.2.1.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.2.2 SUBSTATION B

1.2.2.1 11KV INDOOR CAPACITOR BANK

1.2.2.1.1 02 No. of 11kV incomer units for two sets of Capacitor Banks, each incomer unit comprising:-

1 No. - 1250A, 12kV three phase circuit breaker, design for breaking capacitive currents (or required rating shall be based on calculation) with motor operating mechanism

1 No. - 1250 A, 12 kV, 25kA three phase disconnector and earth switch with motor operating mechanism

3 Nos. - Single phase voltage transformers, ratio 11,000/√3:110/√3 V class 3P for under voltage and over voltage protection.

1.2.2.1.2 03 Nos. of 11kV 4Mvar, Metal Enclosed Switched Capacitor Bank each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor.

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse.

3 Nos. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate

1.2.2.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.2.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing 110DC Main switchboard shall be modified to accommodate proposed modifications.

1.2.2.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.2.4.1 Substation Automation System:-

Extension work of existing SAS at relevant grids will be carry out by Transmission Control and Protection Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and to be engineered to incorporate the existing ABB SAS system. The Fibre network including accessories like switches shall be provided and installed up to existing master switches of existing SAS. (Bidders are strongly advised to study and quote the exact scope under this item and further clarification can be obtained at the pre bid meeting.)

1.2.2.4.2 Power Quality Analyzer

1No.	-	Power Quality Analysing System as per specification
1 Lot	-	Accessories to connect Current and Voltage Circuit of each transformer bay (11kV), all feeder bays (11kV), 132kV bus bar Voltage and breaker positions of each step unit of capacitor bank.

1.2.2.4.3 12 kV Protection & Control facilities:-

1.2.2.4.3.1 For 3 Nos. 12kV capacitor feeders bay each comprising with:-

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 11kV GIS bay protection configuration shall be modified, it shall be covered under this contract.

1.2.2.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.2.5.1 SCADA Gateways

SCADA Gateway –Substation B GSS

Modification work of existing gateway will be carried out by Transmission – Communications Branch of CEB.

License shall be provided by the contractor for the required number of data points for the modification work.

Modification of SCADA system in Colombo City Distribution Control Centre will be carried out by Colombo City Branch of CEB.

1.2.2.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.2.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires as necessary to accommodate modifications.

1.2.2.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.2.9. POWER AND CONTROL CABLES

1.2.2.9.1 12kV Power cables, joints and terminations

01 Lots 12 kV, Cu, XLPE insulated, aluminium wire armour single core cables for connections between Capacitor bank and 12kV indoor switchgear.

02 Lots cable termination for above mentioned cable circuits to be supplied and terminated at capacitor banks and 12kV GIS bays.

1.2.2.9.3. All low voltage AC power cables and terminations

1.2.2.9.4. All DC power and control cables and terminations

1.2.2.9.5. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.2.9.6 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.2.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.2.11. MARSHALLING KIOSK

N/A

1.2.2.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.1.13. SPARE PARTS

All necessary Spare parts.

1.2.2.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.2.3 SUBSTATION I

Due to the limited space available at Substation I, a prefabricated housing shall be used to install all capacitor bank and incoming switch gears.

1.2.3.1 11KV INDOOR CAPACITOR BANK

1.2.3.1.1 02 Nos. of 11kV incomer units for two set of Capacitor Banks, each incomer unit comprising:-

1 No. - 1250A, 12kV three phase circuit breaker, design for breaking capacitive currents (or required rating shall be based on calculation) with motor operating mechanism

1 No. - 1250 A, 12 kV, 25kA three phase disconnector and earth switch with motor operating mechanism

3 Nos. - Single phase voltage transformers, ratio 11,000/√3:110/√3 V class 3P for under voltage and over voltage protection.

1.2.3.1.2 05 Nos. of 11kV 4Mvar, Metal Enclosed Switched Capacitor Bank each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor.

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse

3 Nos. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1 Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate

1.2.3.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.3.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing substation battery systems with chargers and distribution switchboards, to be replace with this contract. The 110V DC system shall supply the following loads: -

(i) 145kV and 12kVswitchgear standing loads of control, protection and alarms including two 132kV future bays and the capacitor bank load.

(ii) UPS for computer supply.

(iii) Emergency building lighting of 1 kW loading for 8 hours.

(iv) SCADA and Communication system.

(iv) After supply of the above coincident loads for a period of 8hours, the battery shall be capable of two closing and two tripping operations of each circuit breaker within the substation.

1.2.3.3.1 110V Battery System comprising: -

2 Nos. - 110V NiCd battery banks with the minimum capacity of 350Ah (Actual capacity shall be calculate at detail design stage) in each.

2 Sets - Charging equipment with automatic switch-over function.

1 No. - Selector switch for Chargers 1 and 2.

1 Set - DC distribution board.

1 Set - miscellaneous items

Other circuits as may be required for the equipment.

1.2.3.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.3.4.1 Substation Automation System:-

Extension work of existing SAS at relevant grids will be carry out by Transmission Control and Protection Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and to be engineered to incorporate the existing ABB SAS system. The Fibre network including accessories like switches shall be provided and installed up to existing master switches of existing SAS.

(Bidders are strongly advised to study and quote the exact scope under this item and further clarification can be obtained at the pre bid meeting.)

1.2.3.4.2 Power Quality Analyzer

1No.	-	Power Quality Analysing System as per specification
1 Lot	-	Accessories to connect Current and Voltage Circuit of each transformer bay (11kV), all feeder bays (11kV), 132kV bus bar Voltage and breaker positions of each step unit of capacitor bank..

1.2.3.4.3 12 kV Protection & Control facilities:-

1.2.3.4.3.1 For 5 Nos. 12kV capacitor bay each comprising with:-

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 11kV GIS bay protection configuration shall be modified for the interconnection of capacitor bank, it shall be covered under this contract.

1.2.3.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.3.5.1 SCADA Gateways –

SCADA Gateway –Substation I GSS

Modification work of existing gateway will be carried out by Transmission – Communications Branch of CEB.

License shall be provided by the contractor for the required number of data points for the modification work.

Modification of SCADA system in Colombo City Distribution Control Centre will be carried out by Colombo City Branch of CEB.

1.2.3.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.3.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires as necessary to accommodate modifications.

1.2.3.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.3.9. POWER AND CONTROL CABLES

1.2.3.9.1 12kV Power cables, joints and terminations

02 Lots 12 kV, Cu, XLPE insulated, aluminium wire armour single core cables for connections between Capacitor bank and 12kV indoor switchgear.

04 Lots cable termination for above mentioned cable circuits to be supplied and terminated at capacitor banks and 12kV GIS bays.

1.2.3.9.3. All low voltage AC power cables and terminations

1.2.3.9.4. All DC power and control cables and terminations

1.2.3.9.5. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.3.9.6 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.3.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.3.11. MARSHALLING KIOSK

N/A

1.2.3.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.3.13. SPARE PARTS

All necessary Spare parts.

1.2.3.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.2.4 SUBSTATION L (L1 AND L2)

1.2.4.1 11KV INDOOR CAPACITOR BANK

Capacitor bank shall install within the extension of ground floor and first floor of the control building as indicated in the drawings.

1.2.4.1.1 04 Nos. of 11kV incomer units for four sets of Capacitor Banks, each incomer unit comprising:-

1 No. - 1250A, 12kV three phase circuit breaker, design for breaking capacitive currents (or required rating shall be based on calculation) with motor operating mechanism

1 No. - 1250 A, 12 kV, 25kA three phase disconnector and earth switch with motor operating mechanism

3 Nos. - Single phase voltage transformers, ratio 11,000/√3:110/√3 V class 3P for under voltage and over voltage protection.

1.2.4.1.2 05 Nos. of 11kV 4Mvar, Metal Enclosed Switched Capacitor Bank for Substation L1 each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor.

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse

3 Nos. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1 Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate

1.2.4.1.3 05 Nos. of 11kV 4Mvar, Metal Enclosed Switched Capacitor Bank for Substation L2 each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor.

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse

3 Nos. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1 Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate

1.2.4.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.4.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing 110DC Main switchboard shall be modified to accommodate proposed modifications.

1.2.4.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.4.4.1 Substation Automation System:-

Extension work of existing SAS at relevant grids will be carry out by Transmission Control and Protection Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and to be engineered to incorporate the existing ABB SAS system. The Fibre network including accessories like switches shall be provided and installed up to existing master switches of existing SAS. (Bidders are strongly advised to study and quote the exact scope under this item and further clarification can be obtained at the pre bid meeting.)

1.2.4.4.2 12 kV Protection & Control facilities:-

1.2.4.4.2.1 For 10 Nos. 12kV capacitor bay each comprising with:-

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 11kV GIS bay protection configuration shall be modified for the interconnection of capacitor bank, it shall be covered under this contract.

1.2.2.4.2 Power Quality Analyzer

Modification shall be carried out for breaker position of each step units available to the existing Power Quality Analyzer System.

1.2.4.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.4.5.1 SCADA Gateways –

SCADA Gateway –Substation L1 and L2 GSS

Modification work of existing gateway will be carried out by Transmission – Communications Branch of CEB.

License shall be provided by the contractor for the required number of data points for the modification work.

Modification of SCADA system in Colombo City Distribution Control Centre will be carried out by Colombo City Branch of CEB.

1.2.4.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.4.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires as necessary to accommodate modifications.

1.2.4.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.4.9. POWER AND CONTROL CABLES

1.2.4.9.1 12kV Power cables, joints and terminations

04 Lots 12 kV, Cu, XLPE insulated, aluminium wire armour single core cables for connections between Capacitor bank and 12kV indoor switchgear.

08 Lots cable termination for above mentioned cable circuits to be supplied and terminated at capacitor banks and 12kV GIS bays.

1.2.4.9.3. All low voltage AC power cables and terminations

1.2.4.9.4. All DC power and control cables and terminations

1.2.4.9.5. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.4.9.6 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.4.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.4.11. MARSHALLING KIOSK

N/A

1.2.4.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.4.13. SPARE PARTS

All necessary Spare parts.

1.2.4.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.2.5 SUBSTATION M

1.2.5.1 11KV INDOOR CAPACITOR BANK

Due to the limited space available at Substation A, a prefabricated housing shall be used to install all capacitor bank and incoming switch gears.

1.2.5.1.1 02 Nos. of 11kV incomer units for two sets of Capacitor Banks, each incomer unit comprising:-

1 No. - 1250A, 12kV three phase circuit breaker, design for breaking capacitive currents (or required rating shall be based on calculation) with motor operating mechanism

1 No. - 1250 A, 12 kV, 25kA three phase disconnector and earth switch with motor operating mechanism

3 Nos. - Single phase voltage transformers, ratio 11,000/√3:110/√3 V class 3P for under voltage and over voltage protection.

1.2.5.1.2 04 Nos. of 11kV 4Mvar, Metal Enclosed Switched Capacitor Bank each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor.

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse

3 No. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1 Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate

1.2.5.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.5.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing 110DC Main switchboard shall be modified to accommodate proposed modifications.

1.2.5.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.5.4.1 Substation Automation System:-

Extension work of existing SAS at relevant grids will be carry out by Transmission Control and Protection Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and to be engineered to incorporate the existing ABB SAS system. The Fibre network including accessories like switches shall be provided and installed up to existing master switches of existing SAS. (Bidders are strongly advised to study and quote the exact scope under this item and further clarification can be obtained at the pre bid meeting.)

1.2.5.4.2 12 kV Protection & Control facilities:-

1.2.5.4.2.1 For 5 Nos. 12kV capacitor bay each comprising with:-

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 11kV GIS bay protection configuration shall be modified for the interconnection of capacitor bank, it shall be covered under this contract.

1.2.5.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.5.5.1 SCADA Gateways

SCADA Gateway –Substation M GSS

Modification work of existing gateway will be carried out by Transmission – Communications Branch of CEB.

License shall be provided by the contractor for the required number of data points for the modification work.

Modification of SCADA system in Colombo City Distribution Control Centre will be carried out by Colombo City Branch of CEB.

1.2.5.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.5.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires as necessary to accommodate modifications.

1.2.5.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.5.9. POWER AND CONTROL CABLES

1.2.5.9.1 12kV Power cables, joints and terminations

02 Lots 12 kV, XLPE insulated, aluminium wire armour single core cables for connections between Capacitor bank and 12kV indoor switchgear.

04 Lots cable termination for above mentioned cable circuits to be supplied and terminated at capacitor bank and 12kV GIS bays.

1.2.5.9.3. All low voltage AC power cables and terminations

1.2.5.9.4. All DC power and control cables and terminations

1.2.5.9.5. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.5.9.6 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.5.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.5.11. MARSHALLING KIOSK

N/A

1.2.5.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.5.13. SPARE PARTS

All necessary Spare parts.

1.2.5.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.2.6 SUBSTATION N

1.2.6.1 11KV INDOOR CAPACITOR BANK

Due to the limited space available at Substation A, a prefabricated housing shall be used to install all capacitor bank and incoming switch gears.

1.2.6.1.1 02 Nos. of 11kV incomer units for two sets of Capacitor Banks, each incomer unit comprising:-

1 No. - 1250A, 12kV three phase circuit breaker, design for breaking capacitive currents (or required rating shall be based on calculation) with motor operating mechanism

1 No. - 1250 A, 12 kV, 25kA three phase disconnector and earth switch with motor operating mechanism

3 Nos. - Single phase voltage transformers, ratio 11,000/√3:110/√3 V class 3P for under voltage and over voltage protection.

1.2.6.1.2 04 Nos. of 11kV 4Mvar, Metal Enclosed Switched Capacitor Bank each comprising:-

1 Set - 4Mvar (Net value to the system at 11kV), double star connected ungrounded capacitor bank complete with detuned reactor.

1 No. - 630A, 11kV three phase breaker, design for breaking capacitive currents (or required rating shall be based on calculation) and fuse

3 Nos. - 12kV current transformers with cores as follows:

Class 5P20, 400/1 A for BSC bay control

Class 5P20, 400/1 A for over current and earth fault protection

Class 5P20, 400/1 A for overload protection

1 No. - 11kV Single phase Current Transformer with Class 5P20 ratio 5/1A or ratio selected through calculations for Capacitor Unbalance Protection.

1 Lot - Complete set of miscellaneous items required for safe and efficient operation of the capacitor bank, terminal arrangements for single-core cables as appropriate

1.2.6.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.6.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing 110DC Main switchboard shall be modified to accommodate proposed modifications.

1.2.6.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.6.4.1 Substation Automation System:-

Extension work of existing SAS at relevant grids will be carry out by Transmission Control and Protection Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and to be engineered to incorporate the existing ABB SAS system. The Fibre network including accessories like switches shall be provided and installed up to existing master switches of existing SAS. (Bidders are strongly advised to study and quote the exact scope under this item and further clarification can be obtained at the pre bid meeting.)

1.2.6.4.2 12 kV Protection & Control facilities:-

1.2.6.4.2.1 For 5 Nos. 12kV capacitor bay each comprising with:-

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 11kV GIS bay protection configuration shall be modified for the interconnection of the capacitor bank, it shall be covered under this contract.

1.2.6.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.6.5.1 SCADA Gateways

SCADA Gateway –Substation N

Modification work of existing gateway will be carried out by Transmission – Communications Branch of CEB.

License shall be provided by the contractor for the required number of data points for the modification work.

Modification SCADA system in of Colombo City Distribution Control Centre will be carried out by Colombo City Branch of CEB.

1.2.6.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.6.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires as necessary to accommodate modifications.

1.2.6.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.6.9. POWER AND CONTROL CABLES

1.2.6.9.1 12kV Power cables, joints and terminations

02 Lots 12 kV, Cu, XLPE insulated, aluminium wire armour single core cables for connections between Capacitor bank and 12kV indoor switchgear.

04 Lots cable termination for above mentioned cable circuits to be supplied and terminated at capacitor bank and 12kV GIS bays.

1.2.6.9.3. All low voltage AC power cables and terminations

1.2.6.9.4. All DC power and control cables and terminations

1.2.6.9.5. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.6.9.6 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.6.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.6.11. MARSHALLING KIOSK

N/A

1.2.6.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.6.13. SPARE PARTS

All necessary Spare parts.

1.2.6.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.2.7 THILHIRIYA GRID SUBSTATION

1.2.7.1 33KV OUTDOOR CAPACITOR BANK

1.2.7.1.1 02 Nos. of 36 kV ,5 MVAr Breaker Switch Capacitor (BSC) bay each comprsing:

1 No. - 1250 A, 36 kV, 25kA three phase line disconnector and earth switch with motor operating mechanism.

1 No - 1250 A, 36 kV, 25kA three phase circuit breaker complete with operating mechanism.

(Note: Circuit Breaker should be capable of withstanding the capacitive switching. If the single break circuit breaker cannot withstands the voltage difference, double break circuit breaker shall be provided for safe ON/OFF operation of capacitor banks)

3 Nos. - 36kV current transformers with cores as follows:

Class 5P20, 200/1 A for BSC bay control

Class 5P20, 200/1 A for over current and earth fault protection

Class 5P20, 200/1 A for overload protection

1 No - 3-phase 25 kA earth switch with motor operating mechanism.

3 No. - 36 kV ,10kA ,Single phase Surge arrestors with Counters(Subject to the Calculations)

3 Nos. - Single phase voltage transformers, ratio 33,000/√3:110/√3 V class 3P for Under voltage and over voltage protection

1 Set – 5 MVAr (Net value to the system), double star connected ungrounded capacitor banks complete with current limiting & filtering inductor. (Usability of existing capacitor units to the new capacitor bank shall be analysed by the contractor and submit a report to CEB to decide to replace the capacitor units or use the existing capacitor units. The price for the capacitor unit shall be quoted separately.)

1 No. - 36 kV Single phase Current Transformer with Class 5P20 ratio 50/1 A or ratio selected through calculations for Capacitor unbalance Protection

1 lot - Cable terminations, Connections, Connectors , Clamps ,etc.

1.2.7.2 LVAC SWITCH BOARDS

Existing 400V AC Main switchboard shall be modified to accommodate proposed modifications.

1.2.7.3 BATTERIES, CHARGERS, DISTRIBUTION BOARDS AND INVERTER EQUIPMENT

Existing 110DC Main switchboard shall be modified to accommodate proposed modifications.

1.2.7.4 PROTECTION, METERING, MONITORING AND CONTROL

1.2.7.4.1 33 kV Protection & Control facilities:-

1.2.7.4.1.1 For 2 Nos. 33kV capacitor bayS comprising with:-

Each step of the capacitor bank shall be protected as per Clause 5.16.1 of Technical Specification - Grid Substation. If the existing 33kV GIS bay protection configuration shall be modified for the interconnection of the capacitor bank, it shall be covered under this contract.

1.2.7.5. COMMUNICATION EQUIPMENT AND SCADA GATEWAYS/RTUS

1.2.7.5.1 SCADA Gateways

SCADA Gateway –Thulhiriya GSS

Modification work of existing RTU will be carried out by the Transmission – Communications Branch of CEB.

All IEDs supplied under this contract shall be IEC 61850 compatible and Engineered to incorporate in the existing ABB RTU560 system. The required Networking accessories like Network Ports/ Switches / Cables/etc. shall be provided for IEDs and the required Network cabling up to the existing RTU shall be done by the Contractor.

1.2.7.6. SUBSTATION EARTHING

The substation earthing system shall be modified as necessary to cover the new scope of works.

1.2.7.7. LIGHTNING PROTECTION SYSTEM COMPRISING: -

Design and erection of lightning protection system with earth wires as necessary to accommodate modifications.

1.2.7.8. GROUNDING SYSTEM COMPRISING;-

Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes.

1.2.7.9. POWER AND CONTROL CABLES

1.2.7.9.1 36kV Power cables, joints and terminations

02 Lot 33kV, XLPE insulated, aluminium wire armour single core cables for connections between Capacitor bank and 33kV indoor switchgear.

04 Lots cable termination for above-mentioned cable circuits to be supplied and terminated at outdoor gantry and 33kV GIS bays.

1.2.7.9.3. All low voltage AC power cables and terminations

1.2.7.9.4. All DC power and control cables and terminations

1.2.7.9.5. All cables required for Protection, Control, Instrumentation, Communication, SCADA and termination.

1.2.8.9.6 All cables required for station lighting, small power, fire protection, ventilation equipment.

The Contractor shall be responsible for the supply, installation, termination and testing of all cables for the execution of the works.

The Contractor is on a turnkey basis and the prices for Definite Works entered by the Bidder in Schedule of Rates & Prices shall only be varied if the Contract requirements are altered, up or down. For the purpose of such variations, the rates shall be those in Schedule of Prices & Rates.

The rates for supply and installation shall be those appropriate to order of drum lengths as appropriate to each type and rating of cable.

The cable installation rates shall include excavation, backfilling and reinstatement of the ground, installation in concrete trenches and ducts and fixing to cable tracks and supports as necessary.

Control (armored) and power cables shall be laid in concrete trenches, in the switchyard and within the buildings, they shall be cleated to cable trays. Cable trays and supports shall be supplied and installed in accordance with the Specification and included in the prices for Definite Work in Schedule of Prices & Rates.

1.2.7.10. SUPPORTING STRUCTURES

All support structures necessary for the works specified under the Employer's Requirements shall be provided by the Contractor. Materials used for the structures shall comply with the Technical Specification – Grid Substation.

1.2.7.11. MARSHALLING KIOSK

N/A

1.2.7.12. MISCELLANEOUS WORKS

Any work other than listed above.

1.2.7.13. SPARE PARTS

All necessary Spare parts.

1.2.7.14. TOOLS AND INSTRUMENTS

As per the price schedule.

1.3 CIVIL WORKS, INSTALLATION, OTHER SERVICES AND TRAINING

1.3.1 CIVIL WORKS

1.3.1.1 SUBSTATION A

1.3.1.1.1 Preliminary Works

a.) Site Survey

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.1.2 Site formation and up keeping

a) Anti Termite soil treatment

- Anti termite treatment with more than 10 years guaranty shall be done for the area proposed for capacitor bank.

1.3.1.1.3 Cable Trenches & Ducts

- As per chapter 13 of Technical Specification - Grid Substation.

- Provision shall be made for all future cables.

1.3.1.1.4 Foundations

a) For take off structures & switchgear

- As required for all the equipments support structures.

1.3.1.1.5 Lightning protection system

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.1.6 External Lighting & small power supply services

- Shall include all external lighting and small power supply services for capacitor banks

1.3.1.1.7. Construction of Control & Other Buildings

a) Control Building

- Structures required to install prefabricated housing and other required facilities as indicated in the drawings and as per chapter 13 of Technical Specification - Grid Substation.

1.3.1.1.8. Construction of Building Services

a) Air conditioning & ventilation system

- Refer chapter 13 of Technical Specification - Grid Substation.

b) Fire protection for housing.

- Refer chapter 13 of Technical Specification - Grid Substation.

c) Internal Lighting & small power supply services.

- Refer chapter 13 of Technical Specification - Grid Substation

1.3.1.1.9. Miscellaneous Works

- Any work other than listed above.

1.3.1.2 SUBSTATION B

1.3.1.2.1. Construction of Control & Other Buildings

a) Control Building

- Modification as required to install the capacitor bank in the control building.

1.3.1.2.2. Construction of Building Services

a) Air conditioning & ventilation system

- Refer chapter 13 of Technical Specification - Grid Substation.

b) Fire protection for building.

- Refer chapter 13 of Technical Specification - Grid Substation.

c) Internal Lighting & small power supply services.

- Refer chapter 13 of Technical Specification - Grid Substation

1.3.1.2.3. Miscellaneous Works

- Any work other than listed above.

1.3.1.3 SUBSTATION I

1.3.1.3.1 Preliminary Works

a.) Site Survey

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.3.2 Site formation and up keeping

a) Anti Termite soil treatment

- Anti termite treatment with more than 10 years guaranty shall be done for the control building area.

1.3.1.3.3 Cable Trenches & Ducts

- As per chapter 13 of Technical Specification - Grid Substation.

- Provision shall be made for all future cables.

1.3.1.3.4 Foundations

a) For take off structures & switchgear

N/A

1.3.1.3.5 Lightning protection system

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.3.6 Fence, Gates and Boundary Walls

a) Boundary wall and remotely operable gates

- For details refer drawings for boundary wall and gates.

1.3.1.3.7 External Lighting & small power supply services

- Shall include all external lighting and small power supply services for capacitor banks

1.3.1.3.8. Construction of Control & Other Buildings

a) Control Building

-Structures required to install prefabricated housing and other required facilities as indicated in the drawings and as per chapter 13 of Technical Specification - Grid Substation

1.3.1.3.9. Construction of Building Services

a) Air conditioning & ventilation system

- Refer chapter 13 of Technical Specification - Grid Substation.

b) Fire protection for building.

- Refer chapter 13 of Technical Specification - Grid Substation.

c) Internal Lighting & small power supply services.

- Refer chapter 13 of Technical Specification - Grid Substation

1.3.1.3.10. Miscellaneous Works

- Any work other than listed above.

1.3.1.4 SUBSTATION L1 AND L2

1.3.1.4.1 Preliminary Works

Site Survey

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.4.2 Site formation and up keeping

Anti Termite soil treatment

- Anti termite treatment with more than 10 years guaranty shall be done for the control building area.

1.3.1.4.3 Cable Trenches & Ducts

- As per chapter 13 of Technical Specification - Grid Substation.

- Provision shall be made for all future cables.

1.3.1.4.4 Foundations

For take off structures & switchgear

N/A.

1.3.1.4.5 Lightning protection system

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.4.6 External Lighting & small power supply services

- Shall include all external lighting and small power supply services for capacitor banks

1.3.1.4.7. Construction of Control & Other Buildings

a) Control Building

- As indicated in the drawings and as per chapter 13 of Technical Specification - Grid Substation

b) Site Office -Temporary Building at site (Container Type).

c) Temporary Works (Stores, contractor's offices etc)

1.3.1.4.8. Construction of Building Services

a) Air conditioning & ventilation system

- Refer chapter 13 of Technical Specification - Grid Substation.

b) Fire protection for building.

- Refer chapter 13 of Technical Specification - Grid Substation.

c) Internal Lighting & small power supply services.

- Refer chapter 13 of Technical Specification - Grid Substation

1.3.1.4.9. Miscellaneous Works

- Any work other than listed above.

1.3.1.5 SUBSTATION M

1.3.1.5.1 Lightning protection system

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.5.2 External Lighting & small power supply services

- Shall include all external lighting and small power supply services for capacitor banks

1.3.1.5.3. Construction of Control & Other Buildings

a) Control Building

- Structures required to install prefabricated housing and other required facilities as indicated in the drawings and as per chapter 13 of Technical Specification - Grid Substation

Note: Existing roof terrace of the sub M already capable for withstand 11.5kN/m^2. Therefore operational load (uniformly distributed) of the capacitor bank need to be limited to 11.5kN/m^2. If this limit is exceeding, structural modification for the roof terrace shall be proposed. Existing roof top water proofing shall be reinstate after the the installation work.

1.3.1.5.4. Construction of Building Services

a) Air conditioning & ventilation system

- Refer chapter 13 of Technical Specification - Grid Substation.

b) Fire protection for housing.

- Refer chapter 13 of Technical Specification - Grid Substation.

c) Internal Lighting & small power supply services.

- Refer chapter 13 of Technical Specification - Grid Substation

1.3.1.5.5. Miscellaneous Works

- Any work other than listed above.

1.3.1.6 SUBSTATION N

1.3.1.6.1 Cable Trenches & Ducts

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.6.2 Lightning protection system

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.6.3 External Lighting & small power supply services

- Shall include all Switchyard Street and security lighting

1.3.1.6.4. Construction of Control & Other Buildings

a) Control Building

- Modification to the Control Building as required and as per chapter 13 of Technical Specification - Grid Substation

Note: Existing roof terrace of the sub M already capable for withstand 11.5kN/m^2. Therefore operational load (uniformly distributed) of the capacitor bank need to be limited to 11.5kN/m^2. If this limit is exceeding, structural modification for the roof terrace shall be proposed. Existing roof top water proofing shall be reinstate after the the installation work.

1.3.1.6.5. Construction of Building Services

a) Air conditioning & ventilation system

- Refer chapter 13 of Technical Specification - Grid Substation.

b) Fire protection for housing.

- Refer chapter 13 of Technical Specification - Grid Substation.

c) Internal Lighting & small power supply services.

- Refer chapter 13 of Technical Specification - Grid Substation

1.3.1.6.6. Miscellaneous Works

- Any work other than listed above.

1.3.1.7 THULHIRIYA SUBSTATION

1.3.1.7.1 Preliminary Works

a.) Site Survey

- As per chapter 13 of Technical Specification - Grid Substation.

b.) Sub Soil Investigations

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.7.2 Site Clearing

a) Removing of existing foundations and structures.

- Removal of foundation and structures of existing grid substation.
- Removal of existing control cables and power cables.

b) Removal of existing capacitor bank.

1.3.1.7.3 Site formation and up keeping

a) Surface Chipping

- Area covered by the earth mat.

1.3.1.7.4 Cable Trenches & Ducts

- As per chapter 13 of Technical Specification - Grid Substation.

- Provision shall be made for all future cables.

1.3.1.7.5 Foundations

a) For take off structures & switchgear

- As required for all the equipments support structures.

1.3.1.7.6 Lightning protection system

- As per chapter 13 of Technical Specification - Grid Substation.

1.3.1.7.7 External Lighting & small power supply services

- Shall include all external lighting and small power supply services for capacitor banks

1.3.1.7.8. Construction of Control & Other Buildings

a) Site Office

-Temporary Building at site (Container Type).

b) Temporary Works (Stores, contractor's offices etc)

1.3.1.7.9. Construction of Building Services

a) Air conditioning & ventilation system

N/A

b) Fire protection for building.

N/A.

c) Internal Lighting & small power supply services.

N/A

1.3.1.7.10. Miscellaneous Works

- Any work other than listed above.

1.3.2 INSTALLATION

Erection, Installation and commissioning of structures Plant & Equipment specified in the clause 1.2 of Employer's Requirements

a. Substation A
b. Substation B
c. Substation I
d. Substation L (L1 and L2)
e. Substation M
f. Substation N

g. Thulhiriya Substation

1.3.3 OTHER SERVICES

1.3.3.1 TRANSPORT

For Engineering staff personnel as per Chapter 14 of Technical Specification - Grid Substation.

- 01 No. Car
- 01 No. 4 WD Double Cab

including 2500km per month running and maintenance facilities for each vehicle.

Note: purchasing of above mentioned vehicles are decide by the employer.

1.3.3.2 SITE OFFICE

Colombo

The Contactor shall provide and maintain a fully furnished rented building as a site office located near sites of Colombo as mentioned in Clause 13.1.12.2 in Chapter 13 of Technical Specification- Grid Substation.

Thulhiriya

Temporary Building at site (Container Type).

1.3.3.3 ENGINEERS' LIVING ACCOMMODATION

Engineers living accommodation shall be provided to the following sites as per clause 14.1.2 of Technical Specifications-Grid Substations.

The contractor shall provide a fully furnished rented house/building with minimum 02 bed rooms with other facilities, located near sites of Thulhiriya substation from one month from the contract commencement date.

Further the contractor has to maintain the premises including the caretaker facility until completion of the project and handover to CEB.

1.3.3.4 ADHERENCE TO THE ENVIRONMENTAL MITIGATION MEASURES

Bidders are requested to comply with the requirements stated in the Chapter 1, clause 1.7 of Section 6 Part B -Technical Specifications and also to the environmental safeguard measures described in the following documents attached in the section 6 Employers requirement Part D- Supplementary Information.

The said documents prepared in accordance with the governing acts and/or guidelines, which are particularly relevant to this project may be inspected and copy obtained free of charge from the office of the Project Director (SESRIP), at the following address.

Project Manager (SESRIP-P7-Lot A3)

Office of the Project Director

No. 25/1,
Butgamuwa Road, Rajagiriya
Sri Lanka
Telephone: *(+94) 11 288 9650*
Facsimile number: *(+94) 11 288 9763*
Electronic mail address: *nimaldgns.desilva@yahoo.com*

1.3.4 TRAINING

The contractor shall provide the following training modules as specified in clause 14.2 of Technical Specification - Grid Substation;

1. For 06 Nos. Electrical Engineers covering the training modules given in 14.2.13 Breaker Switched Capacitor Banks (Including 2 Nos. Engineers from Transmission Design Unit, 01 Transmission Planning Engineer and 3 Engineers from Project Management Unit)
2. A local training at the site shall be provided to 10 Engineers and 10 Electrical Superintendents as per the clause 14.2.14.