NATIONAL GRID COMPANY OF PAKISTAN LIMITED

TENDER DOCUMENT NO. NOR-140E-2026
(EPC/Turnkey Works)

DESIGN, MANUFACTURE, SUPPLY, INSTALLATION ERECTION, TESTING AND COMMISSIONING OF 500/220KV LUDEWALA SUBSTATION (UPGRADATION FROM 220KV SUBSTATION) AND TWO NO. 500KV LINE BAYS AT 500KV FAISALABAD WEST SUBSTATION

UNDER NGC'S OWN RESOURCES

SINGLE STAGE TWO ENVELOPE

VOLUME-1
(Commercial & Technical Conditions)

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143 - WAPDA HOUSE, LAHORE, PAKISTAN
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INVITATION
FOR BIDS

INVITATION FOR BIDS

Date: _____

Bid Ref. No. :_____

TENDER NO. & TITLE: NOR-140E-2026 - DESIGN, MANUFACTURE, SUPPLY, INSTALLATION, ERECTION, TESTING AND COMMISSIONING OF 500/220KV LUDEWALA SUBSTATION (UPGRADATION FROM EXISTING 220KV SUBSTATION) AND TWO NO. 500KV LINE BAYS AT 500KV FAISALABAD WEST SUBSTATION.

1. National Grid Company of Pakistan Limited (NGCPL) "the Employer", intends to get the Works done for Contract No. **NOR-140E-2026** through NGC own resources. The Scope of Works is as follows:

1. Upgradation of existing 220/132kV Ludewala Substation to 500/220/132 kV Substation and associated Extension Work at 500kV Faisalabad West Substation, for

A - <u>500/220 kV Ludewala Substation</u>

<u>500kV Side</u> (One and Half Breaker Scheme having three (3) complete Dias and one half dia)

i). Two(2) No. Transformer Bays with 3×250 MVA, 525/231/23 kV Auto Transformer Bank.
ii). Five(5) No. 500 kV Line Bays.
iii). Five(5) No. Shunt Reactor Bay with 3×37 MVAR(at 500kV),550/√3 kV Shunt Reactors Bank.
iv). Two No. CVT Bays.
v). Protection, control, metering and Telecommunication & SCADA system.

<u>220kV Side</u> (One and Half Breaker Scheme two(2) half Dia)

i). Two(2) No. Transformer Bays for 3×250 MVA, 525/231/23 kV Auto Transformer Bank.
ii). Protection, control, metering and Telecommunication & SCADA system.
iii). Upgradation of existing 220kV double conductor bus bar to 3×810mm2 Al. Alloy conductor (Coreopsis)

B - <u>Extension Work at 500kV Faisalabad West Substation</u>

<u>500kV Side</u> (One and Half Breaker Scheme two(2) half Dia)

i). Two(2) No. 500 kV Line Bays.
ii). Protection, control, metering and Telecommunication & SCADA system.

2. The Employer invites sealed bids from eligible firms/Bidders for the above scope of Works**. International Competitive Bidding (ICB)** will be conducted in accordance with **Single Stage-Two Envelope (SSTE)** procedure. A foreign Bidder is entitled to bid only in a joint venture with a Pakistani constructor in accordance with the provisions of PEC Bye-laws.

3. Eligible Bidders may obtain further information about the Tender Documents from the Office of the Purchaser, as below:

   Director General (Procurement),
   8th Floor, Shaheen Complex, Egerton Road Lahore, Pakistan
   Postal code: 54000
   Telephone: 92-42-99202597
   Email address: dg.procurement@ngc.gov.pk

4. A complete set of Bidding Documents may be accessed / downloaded by all prospective bidders through NGC website, PPRA website and e-Pak Acquisition and Disposal System (EPADS).

5. All bids must be accompanied by a **Bid Security** of not less than amount of USD 2.4 Million or an equivalent amount in a freely convertible currency. The Bid Security shall be at the Bidder's option, either in the form of Deposit at Call or a Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favor of **Chief Engineer (MP&M) NTDC** on the prescribed Form. The date of currency conversion will be date of Bid Opening.

6. The bids must be submitted through e-PADS only on or before **6th October-2026** at **11:00 am**, however, Bid Security is required to be submitted in Original (hard copy) before bids closing deadline, at the address mentioned at Sr. No. 3. Technical bids will be opened at **11:30 am** on the same day, in the presence of Bidder's representatives who choose.

7. The bidders must quote for the complete scope of work. Bids covering only a part of the work shall be rejected.

8. NGC reserve all its rights regarding rejection of bids as defined in Clause 33(1) of PPRA Rules 2004.

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid and Source of Funds

1.1 **Scope of Bid**

National Grid Company (NGC), (hereinafter called "the Employer") issues this Bidding Document for procurement of the following Works through International Competitive Bidding (ICB):

Bidders must quote for the complete scope of work for the respective Lot. Any bid covering partial scope of work will be rejected as non-responsive, pursuant to Clause IB.24.

1.2 Source of Funds

The Employer will make eligible payments under the Contract for which these Bidding Documents are issued, from his own resources.

1.3 **Throughout this Bidding Document**

(a) the term "in writing" means communicated in written form and delivered against receipt;

(b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and

(c) "day" means calendar day.

IB.2 Eligible Bidders

2.1 The Invitation for Bids is open to all bidders meeting the following requirements:

i) A bidder may be a natural person, private entity, or government-owned enterprise or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a Joint Venture (in which case all partners shall be jointly and severally liable). Subject to sub clause IB 2.1 (iii), the Bidder shall be duly licensed by the Pakistan Engineering Council (PEC) minimum in the appropriate category relevant to the value of the Works or had applied for renewal of license before submission of its bid. In case of Joint Venture, all the partners shall be duly licensed by PEC.

ii) A bidder not having nationality of Pakistan shall have nationality of an eligible country as per Appendix 'A' to instruction to bidders. A bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered, and operates in conformity with the

provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.

iii) Foreign firms shall not be eligible to participate in bidding individually. Foreign firms shall enter into joint venture with Pakistani firm registered with the Council in equivalent/compatible category and submit the same to the employer before participating in bidding. A foreign bidder, in case of award shall get registration from PEC.

iv) Pakistani bidders shall be on Active Taxpayers List (both Income Tax and Sales Tax) of the Federal Board of Revenue and relevant Provincial Revenue Authority. Foreign bidders will get themselves registered from relevant tax authorities after award of contract, as required under law of Pakistan.

v) The Bidder shall not be blacklisted by NGC/ WAPDA/DISCOs/any Government/Public department/Donor Agencies at the time of submission of bids. The Bidder should provide details of previous black listing, if any. An affidavit is to be provided by the Bidder that the Bidder is not black listed by NGC/WAPDA/DISCOs/any Government/Public department/Donor Agencies at the time of submission of bids. Further, the bidder shall submit an Undertaking along with his bid that he has read and accepts the provisions of NGC policy (attached with the bidding document as Annexure-A) for blacklisting of Contractors. Non-submission of this undertaking may result in the rejection of the bid. The said undertaking will subsequently become part of Contract Agreement as well.

vi) The bidder shall submit an unconditional "Comfort Letter" alongwith their bid as per Appendix-D to Bidding Data from a schedule bank (the Bank) in Pakistan extend banking facilities to the bidder including but not limited to opening of Letter of Credit, making payment through direct disbursement procedure, retirement of the shipping documents, issuance of electronic import form (EIF) for custom clearance purposes, in case of award of Contract.
NGC however, shall bear no risk in case of non-commitment by the Bank after award of contract. Further, it shall not be binding upon NGC to avail banking facility from the particular Bank.

vii) The bidder shall submit dully filled/complete Beneficial Ownership Declaration Performa as per S.R.O 592(I)/2022 available at https://www.ppra.org.pk/doc/sro592.pdf

(viii) Firms shall be excluded if by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Pakistan prohibits any import of goods or contracting of works or services from that country or any payments to persons or entities in that country.

IB.3 Eligible Goods and Services

3.1 All Goods and ancillary Services to be supplied under this Contract shall have their origin in eligible countries listed in Appendix 'A' to Instructions to Bidders and all expenditures made under the Contract will be limited to such Goods and Services.

3.2 For purpose of this Clause, "origin" means the place where the Goods or component parts thereof are mined, grown or produced or from where the ancillary services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

3.3 The origin of Goods and Services is distinct from the nationality of the Bidder.

IB.4 Cost of Bidding

4.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

B. BIDDING DOCUMENTS

IB.5 Contents of Bidding Documents

5.1 In addition to Invitation for Bids, the Bidding Documents are those stated below, and should be read in conjunction with any amendment or addenda issued in accordance with Clause IB.7.

1. Instructions to Bidders (ITB) with Appendices to ITB as follows:
   - (i) Appendix A to ITB: Name of Eligible Countries
   - (ii) Appendix B to ITB: Evidence of Bidder's &Subcontractor's capability
     - (a) Form ELI-1: Bidder's Information Sheet
     - (b) Form ELI-2: Joint Venture Information Sheet
     - (c) Form FIN-1: Historical Financial Performance
     - (d) Form FIN-2: Average Annual Turnover
     - (e) Form FIN-3: Availability of Financial Resources
     - (f) Form FIN-4: Financial Requirements of Current Contract Commitments
     - (g) Form EXP-1: Contracts of Similar Size and Nature
     - (h) Form EXP-2: Experience in Key Activities
     - (i) Form EXP-3: Experience of Subcontractors/ Manufacturers

(iii) Appendix C to ITB: Domestic Goods
(iv) Appendix D to ITB: Comfort Letter
(v) Appendix E to ITB: Form of Bid Security

2. Letter of Technical Bid & Schedules to Bid as follows:

(i) Schedule A: Specific Works data (Schedule of Technical Data)
(ii) Schedule B: Proposed Organization for the Project & Work Methodology
(a) Form 1: Site Organization & Method Statement
(b) Form 2: Mobilization Schedule
(iii) Schedule C: Construction Schedule
(iv) Schedule D: Personnel
(a) Form PER-1: Proposed Personnel
(b) Form PER-2: Resume of proposed Personnel

(v) Schedule E: Subcontractors
Form SUBCON: Proposed Subcontractors/ Manufacturers for Major Items of Plant and Services
(vi) Schedule F: Country of Origin Declaration Form
(vii) Schedule G: Deviations from Technical & Contractual Provisions
(viii) Schedule H: Specimen JV Agreement (if applicable)
(ix) Schedule I: Equipment
(x) Schedule K: An Undertaking that the Bidder has read and accepts NGC's SOP for Blacklisting of Contractors pursuant to Sub-Clause 2.1(v)
(xi) Schedule L: Manufacturer's Authorization

3. Letter of Price Bid & Schedules to Bid
Schedules to Bid are the following:
(i) Schedule J: Integrity Pact
4. Schedule of Prices
5. Preamble to Conditions of Contract
6. General Conditions of Contract (GCC)
7. Particular Conditions of Contract (PCC)
8. Standard Forms
Forms include the following:

(i) Form of Contract Agreement
(ii) Form of Performance Security
(iii) Form of Bank Guarantee for Advance Payment
(iv) Indemnity Bond for Secured Advance
9. Specifications - Special & Technical Provisions
10. Drawings

5.2 The Bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of Bid submission will be at the Bidder's own risk. Pursuant to Clause IB.24, Bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.6 Clarification of Bidding Documents

6.1 A prospective bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Employer with a copy to the Engineer in writing at the address:

Employer Address:

Director General (Procurement) NGC 8th Floor, Shaheen Complex, Lahore, Pakistan.
Postal Code: 54000
Telephone: +92-42-99202597
E-mail: dg.procurement@ngc.gov.pk

Engineer Address:

Director General (Substation Engineering) NGC, 143-WAPDA House, Lahore.
Postal Code: 54000
Telephone: +92-42-99202190
Fax No.: +92-42-99202502
E-mail: ce.sd@ngc.gov.pk

Employer will examine the request for clarification of the Bidding Documents which it receives not later than twenty-one (21) days prior to the deadline for the submission of bids and if needed will issue the clarification/amendment of the Bidding Documents at least fourteen (14) days before the date of submission of Bids (without identifying the source of enquiry). The response to the pre-bid clarifications/amendment will be communicated via uploading on NGC's website and on EPADS.

IB.7 Amendment of Bidding Documents

7.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by issuing addendum.

7.2 Any addendum thus issued shall be part of the Bidding Documents pursuant

to IB 7.1 hereof, and shall be communicated via publishing on NGC's website on EPADS. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer. The bidder shall also confirm in the Form of Bid that the information contained in such addenda have been considered in preparing his bid.

7.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may at its discretion extend the deadline for submission of bids in accordance with Clause IB.19.

C. PREPARATION OF BIDS

IB.8 Language of Bid

8.1 The Bid prepared by the Bidder and all correspondence and documents relating to the Bid, exchanged by the Bidder and the Employer shall be written in the **English language**, provided that any printed literature furnished by the Bidder may be written in another language so long as accompanied by an English translation of its pertinent passages in which case, for purposes of interpretation of the Bid, the English translation shall govern.

IB.9 Documents Comprising the Bid

9.1 The Bidder shall submit the bid through e-PADS only in 2 separate pdf files, one to be referred as "Technical Bid" and the other to be referred as "Price Bid" comprising the following documents in the respective pdf files, however, Bid Security is required to be submitted in original before bids submission deadline. The Bid prepared by the Bidder shall comprise the following components:

I. Technical Bid

(a) Covering Letter for Technical Bid

(b) Letter of Technical Bid duly filled, signed and sealed, in accordance with Clause IB.17.

(c) Bid Security furnished in accordance with clause IB 15 on prescribed format (Appendix-E to ITB)

(d) Power of Attorney, duly notarized, authorizing the signatory of the bid to act for and on behalf of the Bidder in accordance with Clause IB 17.5

(e) Documentary evidence established in accordance with Clause IB.14 that the Plant and ancillary Services to be supplied by the Bidder are eligible Plant and Services and conform to the Bidding Documents.

(f) Documentary evidence in accordance with Clause IB.13, the Bidder's eligibility and qualifications to perform the Contract if its Bid is accepted.

(g) Technical Proposal in accordance with clause IB 14A.

(h) in the case of a bid submitted by a Joint Venture, the Bid shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement. A foreign Bidder is entitled to bid only in a joint venture with a Pakistani constructor in accordance with the provisions of relevant PEC bye-laws.

(i) An affidavit that the Bidder (or any partner in case of joint venture) has not been black listed pursuant to Sub-Clause 2.1(v) (Schedule K to Bid);

(j) List of Proposed Subcontractors/Manufacturers for Major Items of Plant and Services (Form SUBCON of Schedule E to Bid)

(k) Deleted.

(l) Letter of Comfort (Appendix-D to ITB)

(m) PEC license pursuant to Sub-Clause 2.1; and

(n) Any other documents prescribed in Particular Conditions of Contract or Technical Provisions to be submitted with the Bid.

(o) Deleted.

II. Price Bid

(a) Covering Letter for Price Bid

(b) Letter of Price Bid duly filled, signed and sealed, in accordance with Clause IB.17.

(c) **Schedule of Prices** completed in accordance with Clauses IB.11 and IB.12 in separate sealed envelope. The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested. The units and rates in figures entered into the Price Schedules should be typewritten or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive.

(d) Schedule J to Bid, duly filled and signed, in accordance with the instructions contained therein.

(e) Appendix C to ITB, duly filled and signed, in accordance with the instructions contained therein, if applicable.

Bidders applying for eligibility for domestic preference in bid evaluation shall supply all information & evidence to establish the claim for domestic preference required to satisfy the criteria for eligibility as

described in Clause IB.27. The particulars for domestic Goods prescribed in Appendix C to these Instructions shall also be filled in to substantiate claim for domestic preference.

(f) Any other documents prescribed in Particular Conditions of Contract or Technical Provisions to be submitted with the Bid.

(g) Deleted.

IB.10 Letters of Bids and Schedules

10.1 The Bidder shall complete, sign and seal the Letters of Bids, Schedules (A to L, or as modified) to Bid, Appendices to ITB and Schedule of Prices furnished in the Bidding Documents and shall also enclose other information as detailed in Clause IB.9.

10.2 For the purpose of granting a margin of domestic preference pursuant to Clause IB.27, the Employer will classify the Bids, when submitted in one of three groups as follows subject to change, if any, as per policy of the Federal Government as applicable on the date of bid opening:

(a) **Group 'A' Bid.** (i) For Goods for which labour, raw materials and components from within Pakistan account for at least 20% of the ex-factory bid price of the products offered (ii) For Goods for which labour, raw materials and components from within Pakistan account for over 20% and up to 30% of the ex-factory bid price of the products offered (iii) For Goods for which labour, raw materials and components from within Pakistan account for over 30% of the ex-factory bid price of the products offered;

(b) **Group 'B' Bid.** For Goods manufactured in Pakistan for which the domestic value added in the manufacturing cost is less than 20% of the ex-factory bid price; and

(c) **Group 'C' Bid.** For Goods of foreign origin.
In preparing their bids, the Bidders, whether local or foreign, shall enter in the Schedule of Prices, ex-factory price for indigenously manufactured products and CIP price as well as customs duty and sales tax and other import charges for products to be imported from outside Pakistan.

The value addition will be established by the Certificate issued by Engineering Development Board (EDB) Pakistan for this purpose.

IB.11 Bid Prices

11.1 The bidder shall fill up the Schedule of Prices attached to these documents indicating the unit rates and prices of the Works to be performed under the Contract. Prices on the Schedule of Prices shall be entered keeping in view the

instructions contained in the Preamble to the Schedule of Prices. The units and rates in figures entered into Schedules of Prices shall be typewritten, or if written by hand, shall be in print form. Bidder shall quote for the entire Works on a "single responsibility" basis such that the total Bid price covers all the Contractor's commercial, contractual and technical obligations mentioned in or to be reasonably inferred from the Bidding Document in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, and completion of the Works. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the Works and, where so required by the Bidding Document, the acquisition of all permits, approvals, and licenses, etc.; the operation, maintenance, and training services and such other items and services as may be specified in the Bidding Document, all in accordance with the requirements of the General Conditions and Particular Conditions of Contract.

11.2 Bidders shall give a breakdown of the prices in the following manner: Separate numbered Schedules of Prices shall be used for each of the following elements. The total amount from each Schedule (Nos. 1 to 4) shall be summarized in a Grand Summary (Schedule No. 5) giving the total bid price(s) to be entered in the Letter of Price Bid. Absence of the total bid price in the Letter of Price Bid may result in the rejection of the Bid.

Schedule No. 1:	Plant and Mandatory Spare Parts Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from Within the Employer's Country
Schedule No. 3:	Design Services
Schedule No. 4:	Installation and Other Services
Schedule No. 5	Grand Summary (Schedule Nos. 1 to 4)
Schedule No. 6:	Recommended Spare Parts

Bidders shall note that the plant and mandatory spare parts included in Schedule Nos. 1 and 2 above exclude materials used for civil, building, and other construction works. All such materials shall be included and priced under Schedule No. 4, Installation and Other Services.

11.3 In the Schedules, Bidders shall give the required details and a breakdown of their prices as follows:

(a) Plant to be Supplied from Abroad (Schedule of Price No. 1):

(i) the price of the plant shall be quoted carriage, insurance paid freight and inland transportation(CIP)-(Project Site) (along with breakup as CIF (Pakistani Seaport i.e CFR (Pakistani seaports)

and Insurance) and inland transportation including all direct taxes except those given in Subclause IB 11.3(a)(iv);

(ii) Inland Transportation including all taxes applied thereon.

(iii) the total price for the plant.

(iv) all customs duties and other taxes paid or payable in relation to clearance of Plant from port in the Employer's country on the plant if the contract is awarded to the Bidder; and

(b) Plant Supplied from Within the Employer's Country (Schedule of Price No. 2):

(i) the price of the plant shall be quoted on an EXW Incoterm basis (ex works, ex factory, ex warehouse, ex showroom, as applicable), including all customs duties and sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of plant quoted ex works or ex factory, or on the previously imported plant of foreign origin quoted ex warehouse, ex showroom;

(ii) Inland Transportation including all taxes applied thereon

(iii) The total price for the plant.

(iv) Sales tax and other taxes payable in the Employer's country on the plant if the contract is awarded to the Bidder, and

(c) Design Services. (Schedule of Price No. 3). Rates or prices shall include all direct taxes, duties, levies, and charges payable in the Employer's country as of 28 days prior to the deadline for submission of Bids. PST, if any, shall be quoted separately in given column and shall not be made part of total price.

(d) Civil Works (Schedule of Price No. 4(a)). Rates or prices shall include all direct taxes, duties, levies, and charges payable in the Employer's country as of 28 days prior to the deadline for submission of Bids. PST shall be quoted separately in given column and shall not be made part of total price.

(e) Installation and Other Services (Schedule of Price No. 4 (b)) shall be quoted separately and shall include rates or prices for insurance, all labor, contractor's equipment, temporary works, materials, consumables, and all matters and things of whatsoever nature, including operations and maintenance services, the provision of operations and maintenance manuals, training, etc., where identified in the Bidding Document, as necessary for the proper execution of the installation and other services, including all direct taxes, duties, levies, and charges payable in the Employer's country as of 28 days prior to the deadline for submission of bids. PST shall be quoted separately in given column and shall not be made part of total price.

(f) Recommended spare parts (Schedule No. 6) shall be quoted separately from those specified in either subparagraph (a) or (b) above in accordance with the origin of the spare parts.

11.4 The current edition of Incoterms, published by the International Chamber of Commerce shall govern.

11.5 The prices shall be either fixed or adjustable as specified in the Conditions of Contract.

(a) In the case of Fixed Price, prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A Bid submitted with an adjustable price quotation will be treated as nonresponsive and rejected pursuant to Clause IB 27A.

(b) In the case of Adjustable Price, prices quoted by the Bidder shall be subject to adjustment during performance of the contract to reflect changes in the cost elements such as labor, material, transport, and contractor's equipment in accordance with the procedures specified in the corresponding appendix to the Contract Agreement. A Bid submitted with a fixed price quotation will be treated as non-responsive and be rejected.

11.6 If Bids are being invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer any price reduction (discount) for the award of more than one contract shall specify in their Letter of Price Bid the price reductions applicable to each package, or alternatively, to individual contracts within the package, and the manner in which the price reductions will apply.

11.7 The bidder shall fill in rates and prices for all items of the Works described in the Schedule of Prices. Items against which no rate or price is entered by a bidder will not be paid for by the Employer when executed and shall be deemed covered by rates and prices for other items in the Schedule of Prices.

11.8 The bidder's separation of price components in accordance with Sub-Clauses IB 11.1 & IB 11.3 above, will be solely for the purpose of facilitating the comparison of bids by the Employer/Engineer and will not in any way limit its right to Contract on any of the terms offered.

11.9 Any discount offered shall be valid for at least the period of validity of the bid. A discount valid for lesser period shall be considered null and void.

IB.12 Currencies of Bid

12.1 Prices shall be quoted in the following currencies:

(a) For Goods which the bidder will supply for Contract from outside

Pakistan (Schedule of Price No. 1) and Design Services (Schedule of Price No. 3), the prices shall be quoted either in U.S. Dollars or in any other freely convertible currency. While the Chinese Bidders shall quote in CNY. In case of quotation in any other currency, the bidder shall be responsible for any delay in opening of L/C (if occurred) due to any regulatory measure by State Bank of Pakistan.

(b) For Goods which the bidder will supply for Contract from within Pakistan (Schedule of Price No. 2), civil works (Schedule of Price No. 4(a)), and installation services (Schedule of Price No. 4 (b)), the prices shall be quoted in the Pak. Rupees.

12.2 Further, a bidder expecting to incur a portion of its expenditure in the performance of the Contract in more than one currency (but use no more than 3 foreign currencies), and wishing to be paid accordingly, shall so indicate in its bid.

12.3 The currencies of payment shall be as stated in Particular Conditions of Contract. However, provisions in Sub-Clauses 12.1 & 12.2 above, shall not in any way constitute a contractual or legal binding on the Employer for the payment in the currencies required by the Contractor.

IB.13 Documents Establishing Bidder's Eligibility And Qualifications

13.1 Pursuant to Clause IB.9, the bidder shall furnish, as part of its bid, documents establishing the bidder's eligibility to bid and its qualifications to perform the Contract if its bid is accepted.

13.2 The documentary evidence of the bidder's eligibility to bid (Form-ELI-1 of Appendix-B to ITB along with documents mentioned therein) shall establish to the Employer's satisfaction that the bidder, at the time of submission of its bid is from an eligible source country as defined under Clause IB.2.

13.3 Bidder shall submit with its bid the following to establish its qualification to perform the Contract if its bid is accepted, to the Employer's/Engineer's satisfaction:

(a) documentary evidence that the Bidder has the experience required as per sub-clauses IB 13.4 (a) & (b) necessary to perform the Contract i.e. Forms EXP-1, and EXP-2 of Appendix-B to ITB along with document required therein; and

(b) documentary evidence that the Bidder has the financial capability and has access to financial resources required as per sub-clauses IB 13.4 (c), (d) & (e) necessary to perform the Contract i.e. Forms FIN-1, FIN-2, FIN-3 & FIN-4 of Appendix-B to ITB along with document required therein.

13.4 **Bidder's Qualification Criteria:**

Qualification of a bidder shall be evaluated based on following criteria which the bidder must fulfill:

[Provided further in case a Bidder is determined to be the lowest evaluated substantially responsive in more than one Lot, the aggregate requirements delineated under Sub-Clause IB.3 hereof shall apply. In such case, the Employer will reserve right to choose most beneficial scenario for award of Contract.]

a) Contract Experience

Nature of Works	Proposed
New 500kV Substation	The bidder (as main contractor, Management contractor or JV / Consortium partner) shall have executed either one (1) 500kV or higher voltage new substation or one (1) extension works on 500kV substation or Three (3) 220kV new substation in past ten (10) year which have been in operation for at least last two (2) years as of bid opening date. The executed works shall be comprising of civil works, erection, testing and commissioning. In case of JV, the other partner(s) shall have executed at least one (1) civil works, installation, testing and commissioning of 220kV extension works.
Note-I: For the above criteria for substation works, the complexity viz. scope, bus bar arrangement, insulating media (AIS or GIS) and value of the past works does not require to be same or above the work under bidding.	
Note-II: If the contractor has not executed any EPC project in the past as sole entity, they have to propose an engineering firm/ sub-contractor meeting with the following criteria: *"The engineering firm/sub-contractor shall have designed (electrical and civil) at least one Substation project in last five (05) years of same or higher voltage level and same nature which shall be in services for last (02) two years as of bid opening date."*	

a) Historical Financial Performance:

Historical Financial Performance: Submission of UDIN verified audited balance sheets or, if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, for the last five (05) years to demonstrate the current soundness of the Bidder's financial position and its prospective long-term profitability. All financial statements will be interpreted in terms of equivalent USD converted as per National Bank TT&OD rates applicable as on 28 days prior to the technical bid opening date. As a minimum, the Bidder's

net worth calculated as the difference between total assets and total liabilities should be positive for last One (01) Year.

The Employer will take into account the following criteria to verify the financial qualification of the Bidder.

b) Average Annual Turnover

Minimum average annual turnover of USD 40 Million, calculated as best of three years total certified payments received for contracts in progress or completed, within the last 05 years. The average annual turnover may include turnover of affiliates and subsidiaries to the extent of shareholding percentage of the Bidding company provided the turnover is accrued from similar business activity as the Bidding company.

In case of JV, all the JV partners shall jointly meet the requisite criteria with the lead partner and other partner(s) meeting not less than 40% and 25% respectively of the said criteria.

c) Financial Resources

The Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, lines of credit (issued specifically for the subject project) , and other financial means to meet the total cash flow demands of this contract which is being considered equal to **USD 20Million**. (Information to be submitted in prescribed Form FIN-3 Bid given in Section-III of the Bidding Documents).

The Bidder shall provide his current work commitments in form specified in the Bidding Documents.

The bidder shall provide bank certificate for his lines of credit on the prescribed Form specified in the Bidding Documents.

[Note: Credit Lines submitted after opening of bids shall not be acceptable. Any withdrawal of the credit lines from the bidder's creditors during validity of bid shall be considered a withdrawal of bid.]

In case of JV, all the JV partners shall jointly meet the above criteria with lead partner and other partner(s) meeting not less than 40% and 25% respectively of the said criteria.

d) Key Personnel:

The Bidder shall have the personnel for the key positions to be deployed for meeting the following requirements:

No.	Position	Total Work Experience [years]	Experience In Similar Work [years]
1	Project Manager	20	15
2	Chief Engineer	15	10
3	Procurement Specialist	10	5
4	Lead Design Engineer (Civil)	10	8
5	Lead Design Engineer (Electrical)	10	8
6	Construction Manager	10	5
7	Safety Engineer (Accident Prevention Officer)	10	5
7	Site Engineer (Civil)	5	3
8	Site Engineer (Electrical)	5	3
9	Plant Erectors	5	3
10	SCADA / Telecom Engineer	10	8
11	Protection Engineer	10	8
12	Testing and Commissioning Engineer	10	8
13	QA / QC Engineer	10	5
14	Environmental Expert	10	5
15	Social/Resettlement Specialist	10	5

The above personnel shall be graduate engineers or equivalent.

All the participating bidders shall provide an undertaking with the bid that in case a bidder does not meet the key personnel requirement stipulated above, the deficient key personnel will be replaced with personnel having requisite experience during the Pre-Award Negotiations in case of award of contract. The bid of any bidder not accompanied by an undertaking to this effect, even after post bid clarification, shall be rejected.

Joint Venture Related Requirements

(a) One of the joint venture partners shall be nominated as being in-charge and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners.

(b) The partner-in-charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture.

(c) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid stating the conditions under which it will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. No amendments / modifications whatsoever in the joint venture agreement shall be agreed to between the joint venture partners without prior written consent of the Employer.

(d) The maximum J.V. partners shall not be more than three (03).

IB.14 Documents Establishing Goods' Eligibility and Conformity to Bidding Documents

14.1 Pursuant to Clause IB.9, the bidder shall furnish, as part of its bid, documents establishing the eligibility and conformity to the Bidding Documents of all Goods and Services which the bidder proposes to perform under the Contract.

14.2 To establish the eligibility of the plant and services in accordance with IB 3, Bidders shall submit following with the bid.:

(i) The Country of Origin Declaration Form (Schedule F to Bid).

(ii) Manufacturer's Authorization (Schedule L to Bid) in the case of a bidder offering to supply plant under the Contract which the bidder did not manufacture or otherwise produce.

(iii) In case of following equipment, bidder shall establish that the manufacturer has **design/ manufacturing** experience of similar equipment/goods of similar or higher rating and capacity as that of proposed equipment.

Sr. No.	Name of Equipment/ Material
1	500/220kV Auto Transformer Bank
2	Nitrogen Injection Explosion Prevention Fire Protection System
3	500kV 111MVAR Shunt Reactor Bank
4	Circuit Breakers (550kV & 220kV)
5	Disconnectors and Earthing Switches (500kV & 220kV)
6	Current Transformers (500kV & 220kV)
7	Coupling Capacitor Voltage Transformers (500kV & 220kV)
8	Capacitor Voltage Transformers (500kV & 220kV)
9	Potential Transformers (500kV & 220kV)
10	Surge Arrestors (444kV & 198kV)
11	Post Insulators (all voltage levels)

12	Al. Tubular Conductor
13	Al. Stranded Conductor
14	Connectors(500kV & 220kV)
15	Gantries and Steel Structures(500kV & 220kV)
16	AC/DC Auxiliary Panels(500kV & 220kV)
17	Battery Banks and Battery Chargers
18	Control Cables
19	Power Cables
20	Control & Recording Equipment (500kV & 220kV)
21	Relays & Protection System (500kV & 220kV)
22	Grounding System
23	Substation Automation System (SAS) (500kV & 220kV)
24	Telecommunication System (Bidder to give detail of every equipment) (500kV & 220kV)

Such equipment/goods supplied by the manufacturer should have been in satisfactory operation for a continuous period of at least three years and must submit at least one end user certificate to be outside country of manufacturer or satisfactory operational experience of one year in NGC/DISCOs/ K-Electric prior to deadline for submission of Bids.

14.3 The documentary evidence of the Goods and Services' conformity to the Bidding Documents may be in the form of literature, drawings and data and shall furnish:

(a) A detailed description of the Goods, essential technical and performance characteristics in response to the Section 9 (Specifications – Special Provisions) and Section 10 (Specifications – Technical Provisions) .

(b) Completely filled Schedule of Technical Data (Schedule-A to Bid) of each item.

(c) Complete set of technical information, description data, literature and drawings as required in accordance with Schedule A to Bid, Specific Works Data. This will include but not be limited to the following:

(i) A sufficient number of drawings, photographs, catalogues, illustrations and such other information as is necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the Goods/Plant to be furnished.

(ii) Details of equipment and machinery with capacity.

(iii) The approximate weight and dimension of the main components, a brief description of the principal materials and fabrication processes to be used and recommended methods of assembly.

(iv) Any other information which is required for evaluation purposes.

(d) Type Test Reports of offered equipment as per clause 4, Subsection-2 Technical Specifications) of Section-10 (Technical Provisions), including

the complete information regarding outsourced components/ parts of the equipment type tested. The Report shall also include complete identification of the equipment along with drawings stamped by the concerned lab;

(e) An unconditional Undertaking duly signed and stamped by bidder duly supported by manufacturer(s) that in case of award of contract if submitted type test reports are not according to NGC type test policy, he will carry out type tests as per NGC Type Test Policy within the quoted Bid price and without affecting the delivery/ completion period as mentioned in the Bidding Documents.

(f) a list giving full particulars, including available sources, of all spare parts and special tools necessary for the proper and continuing functioning of the plant for the period of 10 years, following completion of Works in accordance with provisions of the contract; and

(g) A clause-by-clause commentary on Technical Provisions, provided with the Bidding Documents, demonstrating the Goods' and Services' substantial responsiveness to those Specifications or a statement of deviations and exceptions to the provisions of the Technical Provisions as required in Schedule G to Bid.

14.4 For purpose of the commentary to be furnished pursuant to Sub-Clause 14.3(g) above, the Bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, designated by the Engineer in the Technical Provisions are intended to be descriptive only and not restrictive. The bidder may substitute alternative standards, brand names and/or catalogue numbers in its bid, provided that it demonstrates to the Engineer's satisfaction that the substitutions are substantially equivalent or superior to those designated in the Technical Provisions. Copies of the standards proposed by the bidder other than those specified in the Bidding Documents shall be furnished.

14.5 The Bidder shall propose, in order of his priority; plant, equipment or goods of not more than two Manufacturers. Employer at his own jurisdiction may evaluate the plant, equipment or goods of only one of such Manufacturers.

IB 14A Technical Proposal, Subcontractors

14A.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Bidding Documents, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time. To furnish Technical Proposal, bidder shall submit following with the bid:

(i) Forms given in Schedule B to Bid, mentioning details of Site Organization, work methodology and Mobilization Schedule.

(ii) Construction Schedule (Schedule C to Bid) giving detail of activities along with timelines thereof.

(iii) List and detail of proposed personnel (Schedule D to Bid).

(iv) Detail of equipment to be used in construction, etc. (Schedule I to Bid).

14A.2 For major items of Works as listed by the Employer in sub-clause IB 14.2 (iii) above and key activities as listed in sub-clause IB 13.4 (b), which the Bidder intends to purchase or subcontract, the Bidder shall give details of the name and nationality of the proposed Subcontractors, including Manufacturers, for each of those items in Form SUBCON of Schedule E to Bid. In addition, the Bidder shall include in its Bid Form EXP-3 of Appendix B to ITB along with information establishing compliance with the requirements specified by the Employer for these items. Bidders are free to propose up to two subcontractors against each item of the Works. Quoted rates and prices will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices will be permitted.

14A.3 The Bidder shall be responsible for ensuring that any Subcontractor proposed complies with the requirements of sub-clauses IB 2.1 (i), (ii), (iv), (v) & (vii) as applicable, and that any plant, or services to be provided by the Subcontractor comply with the requirements of clause IB 3 and clause IB 14.

IB.15 Bid Security

15.1 Each bidder shall furnish, as part of his Technical Bid, a Bid Security in the amount of *USD 2.4 Million* or an equivalent amount in a freely convertible currency.

15.2 The Bid Security shall be, at the option of the Bidder, in the form of Deposit at Call or a Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favor of the Employer (Chief Engineer (MP&M) NTDC) on the prescribed Form annexed to these Documents valid for a period 28 days beyond the Bid Validity date or beyond any period of extension if requested under sub-clause IB 16.2. The Bid Security of Joint Venture shall be in the name of Joint Venture submitting the Bid or in the name of all members of JV (JV may authorize any of its member to submit bid security. However, it will be clearly mentioned that Bid Security is submitted on behalf of JV).

For avoidance of doubt, a Bid Security issued by a foreign bank but not counter guaranteed by a Scheduled Bank in Pakistan*[or a counter guarantee which impacts rights of Employer to encash the Guarantee on 1st written notice from Bank in*

Pakistan] shall not be acceptable and rejected as non-responsive.

[Any mode for submission of bid security apart from aforementioned like Swift Code or Crossed Cheque shall not be acceptable]

15.3 The Bid Security is required to protect the Employer against the risk of bidder's conduct which would warrant the security's forfeiture, pursuant to Sub-Clause 15.7 hereof.

15.4 A bid must be accompanied by an acceptable Bid Security that is unconditional, irrevocable and callable. If a Bidder submits a Bid Security that has following discrepancies (to the extent mentioned against each), the Purchaser shall request the Bidder to submit a compliant Bid Security within fourteen (14) calendar days of receiving such request. Failure to provide a compliant Bid Security within the prescribed period of receiving such a request shall cause the rejection of the Bid. Any bid accompanied by bid security with deviation greater than the extent mentioned below shall be rejected pursuant to clause IB 27A

i. Bid Security amount is short within 10% of Bid Security amount; and/or
ii. Bid Security validity period is short by a maximum of two days.
iii. Any changes with respect to format/text which does not hurt the right of Employer for encashment of the guarantee and does not limit the obligation of the bidder as required in the Bidding Document/Bid Security format.

15.5 The bid securities of unsuccessful bidders will be returned upon award of Contract to the successful bidder or on the expiry of validity of Bid Security whichever is earlier.

15.6 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security, pursuant to Clause IB.34 and signed the Contract Agreement, pursuant to Clause IB.35.

15.7 The Bid Security may be forfeited:

(a) if a bidder withdraws its bid during the period of bid validity, except as provided in sub-clause IB 16.2; or

(b) if a bidder does not accept the correction of his Bid Price, pursuant to Sub-Clause 26.2 hereof; or

(c) if the bidder is involved in Corrupt and/or fraudulent practices.

(d) in the case of a successful bidder, if he fails to:

(i) furnish the required Performance Security in accordance with Clause IB.34, or

(ii) sign the Contract Agreement, in accordance with Clause IB.35.

IB.16 Validity of Bids

16.1 Bids shall remain valid for **[180 days]** after the date of bid opening as prescribed in Clause IB.19. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.

16.2 In exceptional circumstances prior to expiry of bid validity period, the Employer may request the bidders to extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiture of his Bid Security. A bidder agreeing to the request will be required to extend the validity of his Bid Security 28 days beyond the deadline of extended bid validity period, and in compliance with Clause IB.15 in all respects.

IB.17 Format and Signing of Bid

17.1 Bidders are particularly directed that the amount entered on the Letter of Price Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.

17.2 All Forms, Appendices to ITB, Schedules to Bid (A to L), Schedules of Prices are to be properly completed and signed.

17.3 No alteration is to be made in the Form of Bid nor in the Schedules thereto except in filling up the blanks as directed. If any alteration be made or if these instructions be not fully complied with, the Bid may be rejected.

17.4 The Bidder shall submit the bid through e-PADS only in 2 separate pdf files, one to be referred as "Technical Bid" and the other to be referred as "Price Bid" comprising the following documents in the respective pdf files, however, Bid Security is required to be submitted in original before bids submission deadline.

17.5 The Bid shall be signed be signed by a person or persons duly authorized to sign on behalf of the bidder. This authorization shall consist of written Power of Attorney, duly notarized, authorizing the signatory of the bid to act for and on behalf of the Bidder.

i. For foreign firm/bidder, board resolution and power of attorney **(duly attested by Consulate General of Pakistan/Pakistan Embassy)** are required.
ii. For local firm, board resolution and/or power of attorney provided on stamp paper worth Rs.1000 or as per governing law, whichever is higher, are required.

All pages of the Bid and Schedules to Bid shall be initialed and stamped by the person or persons signing the Bid. If either the Letter of Technical Bid or Letter of Price Bid are not signed, the Bid shall be rejected.

In case of non-submission or non-compliance of a valid power of attorney, post bid clarification shall be sought to submit the same or an undertaking for

submission of board resolution and power of attorney **(duly attested by Consulate General of Pakistan/Pakistan Embassy)** within fourteen (14) calendar days of receiving such request and its failure shall lead to rejection of the bid.

17.6 The Bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the Employer, or as are necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

17.7 Bidders shall indicate in the space provided in the Form of Bid their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their Bids and the Contract is to be sent.

17.8 Bidders should retain a copy of the Bidding Documents as their file copy.

D. SUBMISSION OF BIDS

IB.18 Submission of Bids

18.1 The Bidder shall submit the bid through e-PADS only in 2 separate pdf files, one to be referred as "Technical Bid" and the other to be referred as "Price Bid" comprising the following documents in the respective pdf files, however, Bid Security is required to be submitted in original before bids submission deadline

18.2 The Bid security shall be delivered in person or sent by registered mail at the address to Employer as mentioned in the Invitation For Bids.

18.3 Deleted.

18.4 Deleted.

18.5 Deleted.

18.6 Deleted.

18.7 Deleted.

IB.19 Deadline for Submission of Bids

a) Firms are required to submit their bids through e-PADS only. However, Bid Security is required to be submitted in original before bids submission deadline.
b) The Technical bid should be submitted as a single PDF file named "Tender NOR-140-2026 [mention lot no. and name] - TECHNICAL BID - [Name of Proposing Firm]".
c) The Financial bid should be submitted as a single PDF file named "Tender NOR-140-2026 [mention lot no. and name] - FINANCIAL BID - [Name of Proposing Firm]".

The Procuring Agency shall reject the bid, if the bid submitted through e-PADS is found corrupt, unreadable or contains a virus.

19.2 Bids submitted through telegraph, telex, fax or e-mail shall not be considered.

19.3 The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause IB.7, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.20 Late Bids

20.1 (a) Firms are required to submit their bids through e-PADS only on or before bid submission deadline. However, Bid Security is required to be submitted in original before bids submission deadline.

Deadline for Submission of bids:
Date: **6th October-2026**
Time: **11:00 AM**

Employer's address for the purpose of Bid Security submission:

Director General (Procurement) NGC,
8th Floor Shaheen Complex, Egerton Road Lahore,
Pakistan
Telephone No. 92-42-99202597
E-mail address: dg.procurement@ngc.gov.pk

20.1 (b) Deleted.

IB.21 Modification, Substitution and Withdrawal of Bids

21.1 Deleted.
21.2 Deleted.
21.3 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Sub-Clause IB.15.7.

E. BID OPENING AND EVALUATION

IB.22 Bid Opening

22.1 The Employer shall open the Technical Bids in public at the address, on the date, and time specified herein in the presence of Bidder's designated representatives who choose to attend. The Bidders' representatives who are present shall sign a register evidencing their attendance.

Further the attendance will also be marked through e-PADS.

Time: 11.30 Hrs (Refer Invitation for Bids published in Newspapers/available at Website

Date: **6th October-2026**

Address: 8th Floor, Shaheen Complex, Edgerton Road, Lahore

22.2 Deleted.

22.3 Deleted.

22.4 Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, will remain unopened in accordance with IB 22.1.

22.5 The Technical Bids, except the Bids rejected pursuant to Sub-Clause IB.20.1 (a) shall be opened one at a time, and the following read out and recorded:

(a) the name of the Bidder;

(b) the receipt of Original Bid Security; and

(c) any other details as the Employer may consider appropriate.

22.6 Deleted.

22.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing and through the e-PADs by the Employer. Bidders shall be given reasonable notice of the opening of Price Bids.

22.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened.

22.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders` representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance. Further, the attendance will also be marked through e-PADs.

22.10 Price Bids shall be opened and the following read out and recorded:

(a) the name of the Bidder;

(b) the Bid Prices, including any discounts, cross discounts and alternative offers;

(c) any other details as the Employer may consider appropriate.

Only Price Bids, discounts, cross discounts read out and recorded during the opening of Price Bids shall be considered for evaluation.

22.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum: the name of the Bidder, the Bid Price (per lot if applicable), any discounts, cross discounts, and any alternative offers. A copy of the record shall be distributed to all Bidders present at the time of Bid opening.

IB.23 Clarification of Bids

23.1 To assist in the examination, evaluation and comparison of Bids the Employer may, at its discretion, ask the Bidder for a clarification of its Bid. The request for clarification and the response shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids, in accordance with IB 26.2. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing.

23.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid may be rejected.

IB 23A Deviations, Reservation and Omissions

23A.1 During the evaluation of Bids, the following definitions apply:

(a) "Deviation" is a departure from the requirements specified in the Bidding Document;

(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and

(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

IB.24 Preliminary Examination & Determination of Responsiveness of Bids

24.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in IB 9.1(I) have been provided, and to determine the completeness of each document submitted. If any of these documents or information is missing, the Bid may be rejected.

24.2 A Technical Bid shall be rejected as non-responsive if:

(a) Letter of Technical Bid is unsigned pursuant to IB 17.5 or altered pursuant to IB 17.3 or is missing altogether from technical proposal.
(b) its validity is less than the specified period pursuant to IB 16.1
(c) it indicates completion period later than specified limits.
(d) it is not accompanied by power of attorney
(e) bidder or its any member in case of Joint Venture has participated in more than one bid;

(f) it covers scope of work given in Bidding Documents partially.
(g) if Technical Bid and Price Bid are found in one pdf file uploaded in e-PADs.
(h) Bid is not accompanied by a substantially compliant bid security as per IB 15.4
(i) The bid is not accompanied by Beneficial Ownership Declaration Performa as per requirements/Performa delineated in S.R.O 152(I)/2022.
(j) Any other discrepancy is found that constitutes ground for rejection pursuant to Bidding Documents.

24.3 Prior to the detailed evaluation, pursuant to Clause IB.25 the Employer will determine the substantial responsiveness of each Bid to the Bidding Documents. The Employer's determination of a Bid responsiveness will be based on the contents of the Bid itself without recourse to irrelevant evidence. A substantially responsive Bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations, reservation or omission. A material deviation, reservation or omission is one:

(i) which affect in any substantial way the scope, quality or performance of the Works;

(ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the Bidder's obligations under the Contract; or

(iii) whose rectification/adoption would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.

24.4 The Employer shall examine the technical aspects of the Bid submitted in accordance with IB 14A, Technical Proposal, in particular to confirm that all requirements of Section 9 (Specifications – Special Provisions) and Section 10 (Specifications – Technical Provisions)have been met without any material deviation, reservation, or omission.

24.5 A Bid determined as substantially non-responsive will be rejected and will not subsequently be made responsive by the Bidder by correction of the material deviation, reservation or omission.

24.6 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities in the Bid that do not constitute a material deviation, reservation, or omission.

24.7 Provided that a Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Bid

related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

24.8 Provided that a Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made As per IB 27A.

IB.25 Detailed Evaluation of Technical Bids

25.1 The Employer will carry out a detailed technical evaluation of the Bids not previously rejected as being substantially nonresponsive, to determine whether the technical aspects are in compliance with the Bidding Document. The Bid that does not meet minimum acceptable standards of completeness, consistency, and detail, and the specified minimum and/or maximum requirements for specified functional guarantees, will be treated as nonresponsive and hence rejected. To reach such a determination, the Employer will examine and compare the technical aspects of the bids on the basis of the information supplied by the Bidders, taking into account the following:

(a) overall completeness and compliance with the Technical Provisions; deviations from the Technical Provisions; conformity of the plant and services offered with specified performance criteria; suitability of the plant and services offered in relation to the environmental and climatic conditions prevailing at the site; and quality, function and operation of any process control concept included in the Bid. The Bid that does not meet minimum and/or maximum acceptable standards of completeness, consistency, and detail will be rejected for non-responsiveness;

(b) Evaluation of Bidder's experience pursuant to IB 13.4 and IB 13.5 if applicable.

(c) Evaluation of Subcontractor's and/or manufacturer's experience pursuant to IB 14.2, IB 14A.2 & IB 14A.3 as applicable.

(d) Evaluation of Operational Experience of equipment offered pursuant to IB 14.2.

(e) Compliance of offered equipment, listed in Form of Proposed Subcontractors / Manufacturer for Major item of Plant and Services (Form SUBCON of Schedule E to Bid) to Technical Provisions and Specifications therein. This shall include but not limited to evaluation of Schedule of Technical Data of the equipment pursuant to clause-5.6 of

Section-10 (Specification – Technical Provisions). Non-compliance of offered equipment including but not limited to non-submission of Schedule of Technical Data may result in rejection of Bid.

(f) Evaluation of Type Test Reports of the equipment, listed in Form of Proposed Subcontractors / Manufacturer for Major item of Plant and Services, pursuant to Clause 4 subsection-2 (Technical Specifications) of Section-10 (Specification – Technical Provisions).

Pursuant to IB 14.3(e), in case of failure to submit an Undertaking of type tests as per NGC type test policy along with the bid or in response to post bid clarification, such manufacturer shall not be accepted and bidder will be bound to replace the same with acceptable manufacturer. In case of noncompliance, the bid shall be rejected.

All Type Test certificates/reports, reference list, etc. shall be in English language.

(g) An assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section 9.

Non-compliance with equipment and personnel requirements described in Section 9 shall not normally be a ground for bid rejection and such non-compliance will be subject to clarification during bid evaluation and rectification prior to contract award.

If Bidder proposes to subcontract any key activity **on site** (given in IB 13.4 (b), then he shall submit relevant information above in respect of subcontractor.

25.2 The determination of qualification of Bidder, subcontractor or manufacturer shall be based upon an examination of the documentary evidence of the Bidder's, subcontractor's or manufacturer's qualifications submitted by the Bidder. The determination shall not take into consideration the qualifications of other firms such as the Bidder's, subcontractor's or manufacturer's subsidiaries, parent entities, affiliates, subcontractors, or any other firm(s) different from the Bidder, subcontractor or manufacturer else otherwise specified. The Employer/Engineer will have the right to verify the particulars regarding the plant and other related information furnished with the bid, and the joint venture as well as the partners thereof shall be liable for disqualification in the event of any mis-statement/mis-representation on their part

25.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. The Employer reserves the right to reject the bid of any bidder found to be in circumstances described in GCC 45.2 (c). A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.

25.4 The participation of the proposed manufacturers and subcontractors should be confirmed with a letter of intent between the parties, as needed. Should a manufacturer or subcontractor be determined to be unacceptable, the Bid will not be rejected, but the Bidder will be required to propose, without changing its bid price, an acceptable substitute manufacturer or subcontractor meeting the minimum technical specifications stated in Section 10 (Specification – Technical Provisions). If a Bidder does not provide an acceptable substitute manufacturer or subcontractor by the date and time set in the Employer's request for substitution of manufacturer or subcontractor, its Bid may be rejected.

IB.26 Conversion to Single Currency, Correction of Arithmetic Errors

26.1 To facilitate evaluation and comparison, the Employer/Engineer will convert, all Bid Prices/values expressed in the amount in various currencies in which Bid Price is payable, to Pak. Rupees at the Telegraphic Transfer and Over Draft (TT&OD) composite (selling) exchange rates published/authorized by National Bank of Pakistan and applicable to similar transactions, on the date of the opening of technical Bids.

26.2 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:

(a) where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the amounts given under the column for the price breakdown shall prevail and the Total Price will be corrected accordingly, unless in the opinion of the Employer there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line-item total as quoted will govern and the unit rate will be corrected.

(b) where there are errors between the total of the amounts of Schedule Nos. 1 to 4 and the amount given in Schedule No. 5 (Grand Summary), the total of the amounts of Schedule Nos. 1 to 4 shall prevail and the Schedule No. 5 (Grand Summary) will be corrected accordingly;

(c) if there is a discrepancy between the grand total price given in Schedule No. 5 (Grand Summary) and the bid amount in point (1) of the Letter of Price Bid, the grand total price given in Schedule No. 5 (Grand Summary) will prevail and the bid amount in point (1) of the Letter of Price Bid will be corrected; and

if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetical error, in which case the amount in figures shall prevail subject to (a), (b), and (c) above. If the Bidder does not accept the corrected amount of Bid, his Bid will be rejected and his Bid Security forfeited.

IB.27. Domestic Preference

27.1 In the comparison of evaluated Bids, the Goods manufactured in Pakistan, will be granted a margin of preference in accordance with the following procedures, provided the bidder shall have established to the satisfaction of Employer that the manufacturing cost of such Goods includes a domestic value addition equal to at least 20% of the ex-factory Bid price of such Goods as certified by Engineering Development Board (EDB) . Bidders applying for domestic preference shall fill in Appendix C to these Instructions to substantiate their claim. In case of Non submission of information required under Appendix-C, admissibility for price preference shall not be applicable without any further communications/clarifications.

27.2 The Employer**/**Engineer will first review the Bids to determine, the Bid group classification in accordance with Sub-Clause 10.2 hereof.

27.3 The comparison shall be Ex-factory price of the Goods to be offered from within Pakistan (such prices to include all costs as well as custom duties and taxes paid or payable on raw materials and components incorporated or to be incorporated in the Goods) and the DDP (CIP + Customs duty, sales tax and other import charges) Pakistan seaport price of the Goods to be offered from outside Pakistan.

27.4 The lowest evaluated bid of each Group shall first be determined by comparing all evaluated bids in each Group among themselves taking into account:

(a) In the case of Goods manufactured in Pakistan, sales tax, local body charges and other similar taxes which will be payable on the furnished Goods in Pakistan.

(b) In the case of Goods of foreign origin offered from abroad, customs duties, sales tax and other import charges which will be payable on furnished Goods in Pakistan.

(c) In the case of Goods of foreign origin already located in Pakistan, customs duty, sales tax and import charges on CIP price as applicable for Sub-Clause 27.4(b) here above.

27.5 The price preference to Group A bids will be:

(i) 15% of the ex-factory bid price, if the value addition through indigenous manufacturing is at least 20%;

(ii) 20% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 20% and up to 30%; and

(iii) 25% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 30%.

27.6 The applicable price preference i.e., as per Sub-Clause 27.5 here above will be applied to Group A Bid by reducing the ex-factory bid price.

(Note: - Landed cost will be calculated irrespective of the application of domestic preference.)

IB 27A Evaluation and Comparison of Price Bids

27A.1 Prior to detailed evaluation of Price Bids, the Employer shall examine:

(a) signature and alteration of Letter of Price Bid.

(b) fixation or adjustability of quoted price.

(c) Without limiting the particular criteria, the Employer may take into account the following in the Evaluation of Bids:

i. Non-performance by a Bidder on previous contracts with Employer or others;
ii. The quality of a Bidder's performance on previous contracts with Employer or others;
iii. Anticipated or ongoing claims with or in connection with a Bidder;
iv. Any security or safety concerns which Employer may have in respect of a Bidder or its facilities, subcontractors or suppliers;
v. The results of any interview with a Bidder or supplied references: or
vi. Any knowledge of or experience with a Bidder or its principals, directions, officers and employees.

27A.2 Price Bid shall be rejected if:

(a) Letter of Price Bid is unsigned pursuant to IB 17.5 or altered pursuant to IB 17.3 or missing altogether in the price bid.

(b) the quoted price is adjustable during currency of the contract when bidders are required to quote fixed price, and vice versa

27A.3 To evaluate a Price Bid, the Employer shall consider the following:

(a) the bid price, excluding provisional sums and the provision, if any, for contingencies in the Price Schedules;

(b) price adjustment for correction of arithmetical errors in accordance with IB 26.2;

(c) price adjustment due to discounts offered in accordance with IB 11.6;

(d) price adjustment due to quantifiable nonmaterial nonconformities in accordance with IB 24.8;

(e) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with IB 26.1;

(f) application of domestic preference as per clause IB 27, if applicable;

(g) assessment whether the bid is abnormally low in accordance with IB 27A.6; and

(h) Financial Adjustment of Bid Price (Commercial Aspects)

The evaluation of a bid will take into account, in addition to the Bid Price, the following commercial factors (adjustments) in the manner and the extent indicated hereof, to determine the Evaluated Bid Price.

Price Adjustment for Deviation in Terms of Payment

If a bid deviates from the terms of payment/payment conditions as specified in the Conditions of Contract and if such deviation is considered acceptable to the Employer, mark-up earned for any earlier payments involved in the terms outlined in the bid as compared to those stipulated in the Conditions of Contract shall be calculated at the following mark-up rates:

- For foreign currency component: 8% per annum
- For local currency component: KIBOR + 4.5% per annum

and shall be added to the Corrected Total Bid Price for comparison purpose only.

(i) Financial Adjustment of Bid Price (Technical Aspects)

In addition to price adjustment due to commercial aspects, the price of bid will also be adjusted on account of minor technical omission/non-compliance and due to minor omissions or missing items in the scope of work, services, etc. in the manner and to the extent indicated hereof, to determine the Evaluated Bid Price.

(I) Price Adjustment for Completeness in Scope of Work

(i) Scope of work of each bid will be examined for completeness and compliance with the contract requirements. Subject to IB 24.8, if minor item(s) appear to be excluded, or if any Bidder has not quoted price against any particular item or kept blank in price column (the same is considered as missing item), the price adjustment shall be based on the highest price offered for the same item among all responsive bidders. In case of non-availability of price from other Bidders, the price will be estimated by the Employer.

(ii) In case there is a discrepancy between the quantity of an item quoted by the Bidder and the quantity specified in the bidding documents, the quantity specified in the bidding documents shall prevail, and the total cost will be corrected by multiplying the unit rate and quantity.

Note: No price adjustment will be allowed if the major items are missing in the price

schedules and the bid will be rejected. For this purpose major items is defined as an item constituting 10% (calculated in accordance with this provision) of the quoted bid price.

(II) Price Adjustment for Capitalization Losses of Auto Transformer, Shunt Reactor & Battery Charger

The guaranteed losses for the 500kV Shunt Reactor, 500/220kV auto-transformers and Battery Chargers will be evaluated by adding to the bidder's corrected Total Bid Price in accordance with the relevant provisions of NGC specifications.

In the evaluation of tender, the following rates shall be used for the capitalization of losses:

For 500/220 kV Auto Transformer

Capitalized Cost of no-load losses = US$ 5,200 / - per kilowatt
Capitalized Cost for load losses including auxiliary consumption = US$ 1,200 / - per kilowatt

For 500 kV Shunt Reactor

Capitalized Cost of losses = US$ 5,200 / - per kilowatt

For Battery Charger

US $ 1.25/- per watt for overall losses at 25% rated direct current.

For Battery Bank

For purpose of bid evaluation, the quoted price of plante type battery shall be compared with "weighted price" of pasted and tubular type batteries, which shall be taken as follows:

Battery Type	**Scaling Factor**
Pasted Type	1.7 times of its quoted price
Tubular Type	1.4 times of its quoted price

(III) Price Adjustment for Completion Schedule

Bids indicating completion in advance of the dates stated in Preamble to Conditions of Contract, no credit will be given in this evaluation.

Bids indicating completion period later than the period set out in Preamble to Conditions of Contract shall be adjusted in the evaluation by adding a factor of 0.05% of the Corrected Total Bid

Price for each calendar day of completion later than specified period of the completion.

Bids indicating completion beyond **thirty (30) days** later than the dates set out in Preamble to Conditions of Contract, shall not be considered and rejected as non-responsive.

27A.4 The Employer's evaluation of a Bid will exclude and not take into account,

(a) in the case of Plant and Mandatory Spare Parts (Schedule No. 1) supplied from abroad, all indirect taxes and duties, applicable in the Employer's country and payable on the Plant and Mandatory Spare Parts if the Contract is awarded to the Bidder; and

(Note:- The above-mentioned taxes and duties will be taken into account in case of application of landed cost).

(b) in the case of Plant and Mandatory Spare Parts (Schedule No. 2) supplied from within the Employer's country, sales and other indirect taxes, applicable in the Employer's country and payable on the Plant and Mandatory Spare Parts if the Contract is awarded to the Bidder.

(Note:- The above mentioned taxes will be taken into account in case of application of landed cost).

(c) in the case of Design Services (Schedule No, 3), Civil Works (Schedule No. 4 (a)) and Installation and Other Services (Schedule No. 4 (b)), all indirect taxes including PST, applicable in Employer's country.

27A.5 If price adjustment is allowed in accordance with IB 11.5, the estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

27A.6 If the bid of the successful bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analysis for any or all items of the Schedule of Prices to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.34 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

IB.28 Process to be Confidential

28. 1 Subject to Clause 23 heretofore, no Bidder shall contact Employer and/or Engineer on any matter relating to its Bid from the time of the Bid opening to the time the bid evaluation result is announced by the Employer. The evaluation result shall be announced at least ten (10) days prior to award of Contract. The announcement to all bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated.

28.2 Any effort by a Bidder to influence Employer and/or Engineer in the Bid evaluation, Bid comparison or Contract Award decisions may result in the rejection of his Bid.

28.3 Mechanism for redressal of grievances shall be in accordance with PPRA rule No. 48.

F. AWARD OF CONTRACT

IB.29. Post-Qualification

29.1 The Employer, at any stage of the bid evaluation, having credible reasons for or *prima facie* evidence of any defect in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:

Provided that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that bid evaluation report.

29.2 The determination will take into account the bidder's financial, technical and production capabilities. It will be based upon an examination of the documentary evidence of the bidder's qualification submitted under Appendix B to Instructions to Bidders "Evidence of Bidder's & Subcontractor's Capability" by the bidder pursuant to Clause IB.13, as well as such other information as required under the Bidding Documents.

29.3 An affirmative determination will be a pre-requisite for award of the Contract to the lowest evaluated bidder. A negative determination will result in rejection of that bidder's bid in which event, Employer will proceed to undertake a similar determination of the next lowest evaluated bidder's capabilities to perform the Contract satisfactorily.

IB.30 Award Criteria

30.1 Subject to Clause IB.32, the Employer will award the Contract to the bidder

whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be qualified to satisfactorily perform the Contract in accordance with the provisions of Clauses IB.24 to 27A and IB 29.

IB.31 Employer's Right to Vary Quantities

31.1 Employer reserves the right at the time of award of Contract to increase or decrease by upto 15% the quantity of goods and services specified in the Schedule of Prices without any change in the unit price or other terms and conditions.

IB.32 Employer's Right to Accept any Bid and to Reject any or all Bids

32.1 Notwithstanding Clause IB.30, the Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation to inform the affected bidders of the grounds for the Employer's action except that the grounds for its rejection shall upon request be communicated, to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

32.2 No negotiations with the bidder having been evaluated as lowest responsive or any other bidder shall be permitted. However, the Employer may have clarification meeting(s) to get clarify any item(s) in the bid evaluation report.

IB.33 Notification of Award

33.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing ("Letter of Acceptance") that his bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Contract Price").

33.2 The Letter of Acceptance and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the Bidder till signing of the formal Contract Agreement.

33.3 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their bids have been unsuccessful and return their bid securities.

IB.34 Performance Security

34.1 The successful bidder shall furnish to the Employer a Performance Security in

the form and the amount stipulated in the Conditions of Contract within a period of twenty-eight28) days after the receipt of Letter of Acceptance.

34.2 Failure of the successful bidder to comply with the requirements of Sub-Clause IB.34.1 or Clause IB.35 or Clause IB.44 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.35 Signing of Contract Agreement

35.1 Within fourteen (14) days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send to the successful bidder the Form of Contract Agreement provided in the Bidding Documents, duly filled in and incorporating all agreements between the parties for signing and return it to the Employer.

35.2 The formal Agreement between the Employer and the successful bidder shall be executed within fourteen (14) days of the receipt of such Form of Contract Agreement by the successful bidder from the Employer.

G. ADDITIONAL INSTRUCTIONS

IB.36 Instructions not Part of Contract

36.1 Bids shall be prepared and submitted in accordance with the above Instructions to Bidders including Additional Instructions which are provided to assist Bidders in preparing their Bids, and do not constitute part of the Bid or the Contract Documents.

IB.37 Contract Documents

37.1 The Documents which will be included in the Contract are listed in the Form of Contract Agreement set out in these Bidding Documents.

IB.38 Sufficiency of Bid

38.1 Each bidder shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid and of the rates and prices entered in the Schedule of Prices. Except insofar as it is otherwise expressly provided in the Contract, the rates and prices entered in the Schedule of Prices shall cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works.

IB.39 One Bid per Bidder

39.1 Each bidder shall submit only one bid either by himself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid (other than alternatives pursuant to Clause IB.41) will be disqualified and bids submitted by him shall not be considered for evaluation and award.

Two or more firms partially or wholly owned or directed by common individuals, regardless of the extent of their shares or interest with each other shall not be eligible to bid or compete for the same tender. Only one such firm shall be eligible to bid for a tender. However, such firms may form a joint venture to bid as one venture.

IB.40 Bidder to Inform Himself

40.1 The bidder is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the bid and entering into a Contract for execution of the Works. This shall include but not be limited to the following:

(a) inquiries on Pakistani Income Tax/Sales Tax to the Commissioner of the Income Tax and Sales Tax, in Pakistan.

(b) inquiries on customs duties and other import taxes, to the concerned authorities of Customs and Excise Department.

(c) information regarding port clearance facilities, loading and unloading facilities, storage facilities, transportation facilities and congestion at Pakistan seaports.

(d) investigations regarding transport conditions and the probable conditions which will exist at the time the Goods will be actually transported.

IB.41 Alternate Proposals by Bidder

Not Applicable

IB.42 Local Conditions

42.1 Bidder must verify and supplement by his own investigations the information about site and local conditions. However, Employer will assist the Bidder wherever practicable and possible.

42.2 All Bidders are required to visit the site at their own expense to review the areas allocated for the Plant and the interfacing facilities, if any. Bidders may also wish to study local conditions, available facilities, communications, craft wages, roads and other transport facilities. Bidders shall also acquaint themselves with the relevant laws, rules, and regulations of Pakistan.

42.3 The Bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the Bidders, their personnel and agents, will release and indemnify the Employer, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any

other loss, damage, costs and expenses incurred as a result of such inspection.

IB.43 Pre-Bid Meeting

43.1 The Purchaser may, on his own motion or at the request of any prospective Bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents.

Pre-bid meeting will be held as per the following schedule:
Date:

Venue:

All prospective Bidders or their authorized representatives are invited to attend the pre-bid meeting.

All prospective Bidders or their authorized representatives are invited to attend such a Pre-Bid meeting.

43.2 The Bidders are requested to submit questions, if any, in writing so as to reach the Purchaser not later than seven (7) days before the proposed pre-bid meeting.

43.3 Absence at the pre-bid meeting will not be a cause for disqualification of a Bidder.

IB.44 Integrity Pact

The Bidder shall sign and stamp the Integrity Pact provided at Schedule-J to Bid in the Bidding Document for all Federal Government procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the bid non-responsive.

IB.45 General Performance of the Bidders

45.1 The Employer reserves the right to obtain information regarding performance of the Bidders on their previously awarded contracts/works. The Employer may in case of consistent poor performance of any Bidder as reported by the employers of the previously awarded contracts, interalia, reject his bid and/or refer the case to the Pakistan Engineering Council. Upon such reference, PEC in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.

IB 46 (**GRIEVANCE REDRESSAL & COMPLAINT REVIEW MECHANISM**)

46.1. Any party can file its written complaint against the eligibility parameters or any other terms and conditions prescribed in the prequalification or bidding documents found contrary to provision of Procurement

Regulatory Framework, and the same shall be addressed by the GRC well before the bid submission deadline.

46.2. Any Bidder feeling aggrieved by any act of the procuring agency after the submission of his bid may lodge a written complaint concerning his grievances not later than seven days of the announcement of technical evaluation report and five days after issuance of final evaluation report.

46.3. In case, the complaint is filed against the technical evaluation report, the GRC shall suspend the procurement proceedings.

46.4. In case, the complaint is filed after the issuance of the final evaluation report, the complainant cannot raise any objection on technical evaluation of the report:

Provided that the complainant may raise the objection on any part of the final evaluation report in case where single stage one envelop bidding procedure is adopted.

46.5. The GRC, in both the cases shall investigate and decide upon the complaint within ten days of its receipt.

46.6. Any bidder or the procuring agency not satisfied with the decision of the GRC may file Appeal before the Appellate Committee of the Authority on prescribed format after depositing the Prescribed fee.

46.7. The Committee, upon receipt of the Appeal against the decision of the GRC complete in all respect shall serve notices in writing upon all the parties to Appeal.

46.8. The committee shall call the record from the concerned procuring agency or the GRC as the case may be, and the same shall be provided within prescribed time.

46.9. The committee may after examination of the relevant record and hearing all the concerned parties, shall decide the complaint within fifteen (15) days of receipt of the Appeal.

46.10. The decision of the Committee shall be in writing and shall be signed by the Head and each Member of the Committee. The decision of the committee shall be final.

IB 47 Mechanism of Blacklisting

47.1. The Procuring Agency shall bar for not more than the time prescribed in Rule-19 of the Public Procurement Rules, 2004, from participating in their respective procurement proceedings, bidder or contractor who either:

i. Involved in corrupt and fraudulent practices as defined in Rule-2 of Public Procurement Rules;
ii. Fails to perform his contractual obligations;
iii. Fails to abide by the its securing declaration; and
iv. Submits false information (or) hides information on Beneficial Ownership Declaration Performa under S.R.O 592(I)/2022.

47.2. The show cause notice shall contain: (a) precise allegation, against the bidder or contractor; (b) the maximum period for which the Procuring Agency proposes to debar the bidder or contractor from participating in any public procurement of the Procuring Agency; and (c) the statement, if needed, about the intention of the Procuring Agency to make a request to the Authority for debarring the bidder or contractor from participating in public procurements of all the procuring agencies.

47.3. The procuring agency shall give minimum of seven days to the bidder or contractor for submission of written reply of the show cause notice

47.4. In case, the bidder or contractor fails to submit written reply within the requisite time, the Procuring Agency may issue notice for personal hearing to the bidder or contractor/ authorize representative of the bidder or contractor and the procuring agency shall decide the matter on the basis of available record and personal hearing, if availed.

47.5. In case the bidder or contractor submits written reply of the show cause notice, the Procuring Agency may decide to file the matter or direct issuance of a notice to the bidder or contractor for personal hearing.

47.6. The Procuring Agency shall give minimum of seven days to the bidder or contractor for appearance before the specified officer of the Procuring Agency for personal hearing. The specified officer shall decide the matter on the basis of the available record and personal hearing of the bidder or contractor, if availed

47.7. The procuring Agency shall decide the matter within fifteen days from the date of personal hearing unless the personal hearing is adjourned to a next date and in such an eventuality, the period of personal hearing shall be reckoned from the last date of personal hearing.

47.8. The Procuring Agency shall communicate to the bidder or contractor the order of debarring the bidder or contractor from participating in any public procurement with a statement that the bidder or contractor may, within thirty days, prefer a representation against the order before the Authority.

47.9. Such blacklisting or barring action shall be communicated by the procuring agency to the Authority and respective bidder or bidders in the form of

decision containing the grounds for such action. The same shall be publicized by the Authority after examining the record whether the procedure defined in blacklisting and debarment mechanism has been adhered to by the procuring agency.

47.10. The bidder may file the review petition before the Review Petition Committee Authority within thirty days of communication of such blacklisting or barring action after depositing the prescribed fee and in accordance with "Procedure of filing and disposal of review petition under Rule-19(3) Regulations, 2021". The Committee shall evaluate the case and decide within ninety days of filing of review petition

47.11. The committee shall serve a notice in writing upon all respondent of the review petition. The notices shall be accompanied by the copies of review petition and all attached documents of the review petition including the decision of the procuring agency. The parties may file written statements along with essential documents in support of their contentions. The Committee may pass such order on the representation may deem fit.

47.12. The Authority on the basis of decision made by the committee either may debar a bidder or contractor from participating in any public procurement process of all or some of the procuring agencies for such period as the deemed appropriate or acquit the bidder from the allegations. The decision of the Authority shall be final.

(H) APPENDICES

The Appendices to ITB are as given below:

- Appendix-A: Name of Eligible Countries
- Appendix-B: Evidence of Bidder's Capabilities
- Appendix-C: Domestic Goods (value added in Pakistan)
- Appendix-D: Comfort Letter
- Appendix-E: Form of Bid Security

Appendices are given here below:

Appendix A to
Instructions to Bidders

NAME OF ELIGIBLE COUNTRIES

All countries of the World with whom Islamic Republic of Pakistan has commercial / trade relations except India, Israel and the countries upon which international sanctions are imposed.

Appendix B to
Instructions to Bidders

EVIDENCE OF BIDDER'S & SUBCONTRACTOR'S CAPABILITY

[Note: Bidders to fill following forms to provide information regarding its eligibility and capability]

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of a Joint Venture, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone number(s), fax number(s), e-mail address)	

Attached are copies of the following documents:.

- ❑ 1. In case of a single entity, articles of incorporation or constitution of the legal entity named above, in accordance with IB 4.1
- ❑ 2. Authorization to represent the firm or Joint Venture named above, in accordance with IB 17.5
- ❑ 3. In case of a Joint Venture, a letter of intent to form a Joint Venture or Joint Venture agreement, in accordance with IB 13.5.

Form ELI - 2: Joint Venture Information Sheet

Each member of the Joint Venture must fill out this form separately. Subcontractor must also fill out this form.

Joint Venture/Subcontractor Information	
Bidder's legal name	
Joint Venture Partner's or Subcontractor's legal name	
Joint Venture Partner's or Subcontractor's country of constitution	
Joint Venture Partner's or Subcontractor's year of constitution	
Joint Venture Partner's or Subcontractor's legal address in country of constitution	
Joint Venture Partner's or Subcontractor's authorized representative information (name, address, telephone number(s), fax number(s), e-mail address)	
Attached are copies of the following documents: ❑ 1. Articles of incorporation or constitution of the legal entity named above, in accordance with IB 2.1 ❑ 2. Authorization to represent the firm named above, in accordance with IB 17.5	

Form FIN - 1: Historical Financial Performance

Each Bidder must fill out this form.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Financial Data for Previous 3 Years [$ Equivalent]				
Year 1:	**Year 2:**	**Year 3:**	**Year 4:**	**Year 5:**

Information from Balance Sheet

Total Assets (TA)			
Total Liabilities (TL)			
Net Worth = TA-TL			
Current Assets (CA)			
Current Liabilities (CL)			

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			

❑ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last 5 years, as indicated above, complying with the following conditions.

- All such documents reflect the financial situation of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries or affiliates.
- Historical financial statements must be audited by a certified accountant.
- Historical financial statements must be complete, including all notes to the financial statements.
- Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Form FIN - 2: Average Annual Turnover

Each Bidder must fill out this form.

The information supplied should be the Annual Turnover of the Bidder or each member of a Joint Venture in terms of the amounts billed to clients for each year for work in progress or completed, converted to US dollars as specified in Clause ITB-13.4.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Annual Turnover Data for the Last 5 Years			
Year	**Amount Currency**	**Exchange Rate**	**$ Equivalent**
		Average Annual Turnover	

Form FIN – 3: Availability of Financial Resources

Bidders shall specify proposed sources of financing, such as liquid assets, lines of credit and other financial means to meet the Bidder's financial requirements for

(a) its current contract commitments calculated on three (03) months basis, and

(b) the subject contract.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Financial Resources		
No.	**Source of financing**	**Amount ($ equivalent)**
1	Liquid Assets	
2	Credit Line[a]	
3	Other Financial Resources	
	Total Available Financial Resources	

[a] *To be substantiated by a letter from the bank issuing the line of credit.*

Form FIN- 4: Financial Requirements for Current Contract Commitments

Bidders (or each Joint Venture partner) should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Current Contract Commitments

No.	Name of Contract	Employer's Contact (Address, Tel, Fax)	Total Contract Value (Equivalent USD)	Contract Completion Date	Outstanding Contract Value (X) *a*	Remaining Contract Period in months (Y) *b*	Monthly Financial Resources Requirement (X / Y)
1							
2							
3							
4							
	Total Monthly Financial Requirement for Current Contract Commitments						$ . . . . .

a *Remaining outstanding contract values to be calculated from 28 days prior to the bid submission deadline ($ equivalent based on the foreign exchange rate as of the same date).*

b *Remaining contract period to be calculated from 28 days prior to bid submission deadline.*

c. *The monthly commitments calculated from above table will be multiplied with a factor (proposed "3") to calculated the total commitments for 03 months.*

Form: Credit Line

BANK CERTIFICATE

This is to certify that M/s…… is a reputed company with a good financial standing.

If the contract for namely …… (name of IFB) is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of PKR/US$…… to meet their financial resources requirements for executing the above contract.

Signature of Senior Bank Manager: _____
Name of the Senior Bank Manager: _____
Address of the Bank: _____

Stamp of the Bank

Note: Certificate should be on the letter head of the bank.

- **Change the text as follows for Joint Venture:**

This is to certify that M/s…… who has formed a JV with M/s……and M/s……. for participating in this bid, is a reputed company with a good financial standing.

If the contract for namely ……. (name of IFB) is awarded to the above Joint Venture, we shall be able to provide overdraft/credit facilities to the extent of PKR/US$……to M/s……. to meet the financial resources requirement for executing the above contract.

[This should be given by each of the JV members in proportion to their financial participation.]

Form EXP – 1: Contracts of Similar Size and Nature

Fill out one (1) form per contract.

Contract of Similar Size and Nature		
Contract No. . . . . **of**	**Contract Identification**	
Award Date		**Completion Date**
Role in Contract	❑ **Contractor** ❑ **Management Contractor** ❑ **Subcontractor**	
Total Contract Amount		**$**
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	**Percent of Total**	**Amount**
Employer's name **Address** **Telephone number** **Fax number** **E-mail**		
Description of the Similarity in Accordance with IB 13.4 (a)		

❑ Attached are copies of:

- Contract agreements with sufficient details to establish bidder's experience in accordance with IB 13.4,
- Joint Venture Agreements (applicable if contract performed in joint venture) with sufficient detail of bidder's participation.
- Verifiable End User Certificates establishing successful operation of contracts for the period mentioned in IB 13.4 on end user's proper letter head showing email address, telephone no., fax no., postal address, etc.

➢ Notarized English translation shall also be attached if any document is not in English language.

➢ All documents shall reflect experience of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries or affiliates.

Form EXP - 2: Experience in Key Activities

Contract with Similar Key Activities		
Contract No. . . . . of	**Contract Identification**	
Award Date		**Completion Date**
Role in Contract	❑ **Contractor** ❑ **Management Contractor** ❑ **Subcontractor**	
Total Contract Amount		**$**
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	**Percent of Total**	**Amount**
Employer's name **Address** **Telephone number** **Fax number** **E-mail**		
Description of the Key Activities in Accordance with IB 13.4 (b)		

❑ Attached are copies of:

- Contract agreements with sufficient details to establish bidder's experience in accordance with IB 13.4,
- Joint Venture Agreements (applicable if contract performed in joint venture) with sufficient detail of bidder's participation.
- End User Certificates establishing successful operation of contracts for the period mentioned in IB 13.4.

➢ Notarized English translation shall also be attached if any document is not in English language.

➢ All documents shall reflect experience of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries or affiliates.

Fill out one (1) form per contract.

Form EXP - 3: Experience of Subcontractors/ Manufacturers

Fill out one (1) form per contract.

Contract for the Major Items		
Contract No . . . . . .of.	**Contract Identification**	
Award Date		**Completion Date**
Role in Contract	❑ **Contractor** ❑ **Management Contractor** ❑ **Subcontractor**	
Total Contract Amount		**$**
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	**Percent of Total**	**Amount**
Employer's name **Address** **Telephone number** **Fax number** **E-mail**		
Description of the Major Items in Accordance with sub-clause IB 14.2		

In case of manufacturers, please attach:

- Copies of relevant supply record, contract agreements, Inspection certificates/ Bill of Lading etc. to prove experience and supply.
- Manufacturer's Authorization
- One satisfactory Operational Certificate from end user from Pakistan or outside the country of origin of offered equipment/goods. The submitted certificate must indicate the name of the end user/client along with its contact address, phone numbers, fax numbers, web-site and e-mail addresses.
- The equipment/goods supplied by the manufacturer should have been in satisfactory operation for a continuous period of at least three years and bidder must submit at least one end user certificate to be outside country of manufacturer or satisfactory operational experience of one year in NGC/DISCOs/ K-Electric prior to deadline for submission of Bids.

In case of Subcontractors of Key activities, please attach:

- Contract agreements with sufficient details to establish bidder's experience in accordance with IB 13.4,
- Joint Venture Agreements (applicable if contract performed in joint venture) with sufficient detail of bidder's participation.
- End User Certificates establishing successful operation of contracts for the period mentioned in IB 13.4.

➢ Notarized English translation shall also be attached if any document is not in English language.

➢ All documents shall reflect experience of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries or affiliates.

Note:

1. No change of Sub-Contractor shall be made by the Bidder without prior approval of the Employer.
2. The truthfulness and accuracy of the statement as to the experience of Subcontractors is guaranteed by the Bidder. The Employer's judgment shall be final as to the evaluation of the experience of Subcontractors submitted by the Bidder.
3. Statement of similar works shall include description, location & value of work, year completed and name & address of the clients.
4. This may include manufacturer(s) who are proposed here and their relevant details to be provided accordingly including make, capacity and salient features to make it particularly suitable for the works. The technology used should also be detailed adequately.

Initials of Signatory to Bid:……

Appendix C to Instructions to Bidders

Domestic Goods (Value added in Pakistan)

[Bidders claiming eligibility for domestic preference should fill in for supply items only, all columns hereunder and provide necessary documentation to substantiate their claim]

Sr. No.	Description of Indigenous Goods	Unit	Qty	Total Price of Goods Ex-Factory (Pak Rs.)	Domestic value added in the manufacturing cost as percentage of Ex-Factory Price	Amount of value addition (Pak Rs.)
1	2	3	4	5	6	7
Total in columns 5 & 7						

Computations:

A. Total amount of Value Addition (from Col.7) Rs_____
B. Total Ex-Factory Price of Indigenous Goods (from Col.5) Rs_____
C. Total DDP Price of imported supply items Eqv.Rs_____
D. Total Price of supply items [B+C] Eqv.Rs_____
E. % of value addition = [(A/D)x100] _____%
F. Domestic Preference =(15,20 or 25)% of B Rs_____

Note-I: The above factors for value addition shall be substantiated with Certificate issued by Engineering Development Board (EDB) Pakistan.
Note-II: The indigenously produced goods for which domestic preference has been claimed and thereby granted, cannot be replaced with goods of foreign origin after award of contract.

Appendix D to

Instructions to Bidders

COMFORT LETTER

Bid for Contract No. _____:_____ [*Title of Contract*]

To:
(Insert Employer Name)

Gentleman,

i. This is to certify that if the subject EPC Contract is awarded to M/s _____ ___ incorporated under the laws of _____ [*insert name of country*] we are able as well as willing to provide / extend unconditional banking facilities including but not limited to opening of letter of credit or making payment through direct payment procedure, retirement of shipping documents, issuance of Electronic Import Form (EIF) for custom clearance purposes etc.
ii. We understand that the issuance of this letter does not create any obligation for NGC.

Signature of Senior Bank Manager: _____

Name of the Senior Bank Manager: _____

Address of the Bank: _____

Stamp of the Bank

- **Change the text under para (i) as follows in case of Joint Venture**

M/s _____ incorporated under the laws of _____ [*insert name of country*] has formed a JV with M/s _____ and M/s ____ _____ for participating in this bid.

i. This is to certify that if the subject Contract is awarded to the above Joint Venture, we are able as well as willing to provide / extend banking facilities including but not limited to opening of letter of credit, making payment through direct payment procedure, retirement of shipping documents, issuance of Electronic Import Form (EIF) for custom clearance purposes etc.
ii. We understand that the issuance of this letter does not create any obligation for NGC. [*This should be given by each of the JV members*]

Note: Certificate should be on the letter head of the Scheduled Bank in Pakistan.

*[Note: **The requirement of "Comfort Letter" has been included purely for payment purposes to ensure the availability of banking channels for smooth execution of Contract. The "Comfort Letter" is neither a Bank Guarantee nor is required to determine financial soundness of the Bidder, and does not create any legal obligation to bank, but rather is a simple confirmation on bank's letter head that in case of award of Contracts to specific firm, the banking channels will be available for making payment by NGC in favor of Supplier.***

Moreover, a Bank can provide confirmation in its own wording without changing the substance of letter i.e., assuring to provide banking channel if given business]

Appendix E to
Instructions to Bidders

Form of Bid Security

(Bank Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address:_____
Name of Principal (Bidder) with address:_____
_____
Penal Sum of Security (express in words and figures):_____
_____
Bid Reference No._____ Date of Bid Opening _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal, we the Guarantor above-named are held and firmly bound unto the _____, (hereinafter called The "Employer") in the sum stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid numbered and dated as above for _____ (Particulars of Bid) to the said Employer; and

WHEREAS, the Employer has required as a condition for considering the said Bid that the Principal furnishes a Bid Security in the above said sum to the Employer, conditioned as under:

(1) that the Bid Security shall remain valid for a period 28 days beyond the period of validity of the Bid;

(2) that in the event of;

(a) the Principal withdraws his Bid during the period of validity of Bid, or

(b) the Principal does not accept the correction of his Bid Price, pursuant to

Sub-Clause 26.2 of Instructions to Bidders, or

(c) the bidder is involved in Corrupt and/or fraudulent practices, or

(c) failure of the successful bidder to

(i) furnish the required Performance Security, in accordance with Clause 34 of Instructions to Bidders, or

(ii) sign the proposed Contract Agreement, in accordance with Clause 35 of Instructions to Bidders,

then the entire sum be paid immediately to the said Employer as liquidated damages and not as penalty for the successful bidder's failure to perform.

NOW THEREFORE, if the successful bidder shall, within the period specified therefor, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer in accordance with his Bid as accepted and furnish within twenty eight (28) days of his being requested to do so, a Performance Security with good and sufficient surety , as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

PROVIDED THAT the Guarantor shall forthwith pay to the Employer the said sum stated above upon first written demand of the Employer without cavil or argument and without requiring the Employer to prove or to show grounds or reasons for such demand notice of which shall be sent by the Employer by registered post duly addressed to the Guarantor at its address given above.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal has duly performed his obligations to sign the Contract Agreement and to furnish the requisite Performance Security within the time stated above, or has defaulted in fulfilling said requirements and the Guarantor shall pay without objection the sum stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above bounden Guarantor has executed the instrument under its seal on the date indicated above, the name and seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

_____

Guarantor (Bank)

Witness: Signature _____

1. _____ Name _____

_____ Title _____

Corporate Secretary (Seal)

2. _____ _____

_____ _____

(Name, Title & Address) Corporate Guarantor (Seal)

LETTER OF TECHNICAL BID AND SCHEDULES TO BID

Letter of Technical Bid

Schedules to Bid

- Schedule A to Bid: Specific Works Data (**Schedule of Technical data**)
- Schedule B to Bid: Proposed Organization for the Project & Work Methodology
  - Form 1: Site Organization & Method Statement
  - Form 2: Mobilization Schedule
- Schedule C to Bid: Construction Schedule
- Schedule D to Bid: Personnel
  - Form PER-1: Proposed Personnel
  - Form PER-2: Resume of Proposed Personnel
- Schedule E to Bid: Subcontractors
- Schedule F to Bid: Country of Origin Declaration Form
- Schedule G-1 to Bid: Deviations from Technical Provisions
- Schedule G-2 to Bid: Deviations from Contractual Conditions
- Schedule H To Bid: Specimen JV Agreement
- Schedule I To Bid: Equipment
- Schedule K to Bid: Undertaking Of Acceptance Of And Compliance With The SOP For Blacklisting Of Contractors
- Schedule L to Bid: Manufacturer's Authorization
- Schedule M to Bid: Undertaking for Performance of Type Testing

LETTER OF TECHNICAL BID

Bid Reference No. _____
Package No. _____

_____
_____
(Name of Works)

To:

_____
_____
_____

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, Schedule of Prices and Addenda Nos. _____ for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address _____
_____
and being duly incorporated under the laws of _____
hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto.

2. We understand that all the Schedules attached hereto form part of this Bid.

3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of …… drawn in the favor of, or made payable to the Employer, …… and valid for a period ….. days beyond the period of validity of Bid.

4. We undertake that Price Schedules as per requirements of the Bidding Documents are enclosed with the Price Bid.

5. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.

6. We agree to abide by this Bid for the period of **180** days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

7. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

8. We undertake, if our Bid is accepted, to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of

the Contract.

9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.

10. We do hereby declare that our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries *[insert the nationality of the Bidder, including that of all parties that comprise the Bidder if the Bidder is a consortium or association, and the nationality of each Subcontractor and Supplier]*.

11. We, including any subcontractors or suppliers for any part of the Contract, do not have any conflict of interest.

12. We are not participating, as a Bidder, in more than one bid in this bidding process.

13. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid from a single firm).

Dated this …… day of ……. 20…

Signature ……... in the capacity of ……. duly authorized to sign the Bid for and on behalf of …….
(Name of Bidder in Block Capitals)
(Seal of Bidder)

Bidder's Address
……
……
……

Witness:

Signature:
……
Name: ……

Address:
……
……
……

Occupation
……

SCHEDULE – A TO BID

SPECIFIC WORKS DATA (SCHEDULE OF TECHNICAL DATA)

Lot No.	Description	SCHEDULE OF TECHNICAL DATA
	Design, Manufacture, Supply, Installation Erection, Testing and Commissioning of 500/220kV Ludewala Substation (Upgradation From 220kV Substation) and Two No. 500kV Line Bays at 500kV Faisalabad West Substation	Please fill technical data schedule for equipment given in relevant NGC specifications in Volume-II. Each page of data should be signed and stamped by the manufacturer. A bid without Schedule of Technical Data/ Specific Goods Data (filled in) shall be considered as non-responsive. **(Note: Technical data schedule for equipment not given in relevant specification is attached separately in Volume-II of this bidding document)**

Moreover, complete set of technical information, description data, literature and drawings as required for both Lots. This will include but not be limited to the following:

(i) A sufficient number of drawings, photographs, catalogues, illustrations and such other information as is necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the Goods/Plant to be furnished.

(ii) Details of equipment and machinery with capacity.

(iii) The approximate weight and dimension of the main components, a brief description of the principal materials and fabrication processes to be used and recommended methods of assembly.

Initials of Signatory to Bid:……

SCHEDULE – B TO BID

PROPOSED ORGANIZATION FOR THE PROJECT & WORK METHODOLOGY

FORM 1: SITE ORGANIZATION & METHOD STATEMENT

In this form, bidder shall provide the ITS Organization Chart indicating all positions that will be employed in Head Office, Site Office, etc. (whichever applicable) which shall also include key positions indicated in Technical Provisions. Bidder shall also mention the job description of each key position.

The Bidder is required to submit a narrative outlining the method of performing the Works. The narrative should indicate in detail and include but not be limited to:

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.

- The procedure for installation/erection of equipment and transportation of equipment and materials to the site.

- The Contractor shall provide description of his construction camp's facilities and staff housing requirements.

- The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp and staff housing facilities. The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

    1. Site Preparation (clearing, land preparation, etc.).
    2. Provision of Services.
        a) Power (expected power load, etc.).
        b) Water (required amount and system proposed).
        c) Sanitation (sewage disposal system, etc.).
    3. Construction of Facilities
        a) Contractor's Office, Workshop and Work Areas (areas required and
        proposed layout, type of construction of buildings, etc.).
        b) Warehouses and Storage Areas (area required, type of construction and layout).
        c) Housing and Staff Facilities (Plans for housing for proposed staff,
        layout, type of construction, etc.)
    4. Construction Equipment Assembly and Preparation (detailed plans for carrying out this activity).
    5. Other Items Proposed (Security services, etc.).

Initials of Signatory to Bid:……

SCHEDULE – B TO BID

FORM 2: MOBILIZATION SCHEDULE

In this form, the bidder shall provide details regarding mobilization of its team in Pakistan along with detailed timeline in accordance with Construction Schedule (Schedule C to Bid).

Initials of Signatory to Bid:……

SCHEDULE – C TO BID

CONSTRUCTION SCHEDULE

Bidder shall provide a Construction Schedule in a bar-chart/CPM/PERT form showing the sequence of work items by which he proposes to complete the work of the entire Contract. The Schedule should indicate the sequence of work items and the period of time during which he proposes to complete the Works including the activities like designing, schedule of submittal of drawings, ordering and procurement of materials, manufacturing, delivering, construction of civil works, erection, testing and commissioning of Works to be supplied under the Contract.

Project Completion Period

The Contractor shall complete the above-mentioned scope of work in accordance with the following mandatory completion milestones:

i). **Completion Milestone-I**

The Contractor shall complete, in all respects, the following works within 480 days from the Commencement Date:

1. The complete extension scope of work at 500 kV Faisalabad West Substation as per Section III: Schedule of Prices; and
2. The complete upgradation-related scope of work at 500 kV Ludewala Substation as per Section III: Schedule of Prices, except for the supply and commissioning of the 500KV Auto Transformer Banks.

By the end of the 480-day period, complete scope of works at both substations, other than the supply and commissioning of the Auto Transformer Banks, shall have been completed, tested and made fully available for operation. The Contractor must complete all the upgradation works at 500KV Ludewala Substation scope including construction of complete 500KV switchyard, 220kv switchyard works, Transformer Bays civil works, equipment installation etc. as per Schedule of Prices in all aspects within the mentioned 480 days and only supply and commissioning 500KV Auto Transformer Banks to be done with next 120 days.

The Contractor shall ensure that both substations are fully available to provide the required back-feed to the C-5 Project within the aforesaid 480-day period.

ii). Completion Milestone-II

The Contractor shall complete the remaining scope, including the supply, installation, testing and commissioning of the Auto Transformer Banks at 500 kV Ludewala Substation, within 600 days from the Commencement Date.

The Auto Transformer Banks, including all associated works, testing, protection, control, auxiliary systems and other activities necessary for their safe and satisfactory operation, shall be fully commissioned and ready for commercial operation by the end of the 600-day period.

c. Restriction on Use of the Additional 120 Days

The period from 481 days to 600 days shall be available only for completion of activities related to the Auto Transformer Banks and their associated works.

The Contractor shall not defer, postpone or carry forward any other work forming part of the 480-day milestone into the period beyond 480 days.

Failure to achieve the 480-day milestone shall constitute a failure to meet a mandatory contractual milestone, notwithstanding the overall final completion period of 600 days.

d. Contractor's Planning Responsibility

The Contractor shall plan and execute the procurement, manufacturing, delivery, construction, installation, testing and commissioning activities in such a manner that:

- all works other than the Auto Transformer Banks are completed within 480 days; and
- the Auto Transformer Banks and all associated remaining works are fully completed and commissioned within 600 days.

The Contractor shall not be entitled to any extension of time for activities that could reasonably have been completed within the 480-day milestone due to the Contractor's planning, procurement, engineering, construction or coordination arrangements.

Initials of Signatory to Bid:……

SCHEDULE – D TO BID

PERSONNEL

FORM PER-1: PROPOSED PERSONNEL

Bidders should provide the details of proposed personnel and their experience record in the relevant Information Forms below for each of the candidate along with recent color photograph.

1.	**Title of position***
	Name
2.	**Title of position***
	Name
3.	**Title of position***
	Name
4.	**Title of position***
	Name
etc.	**Title of position***
	Name

-- Note --

******As listed in Technical Provisions*

Initials of Signatory to Bid:……

Form PER – 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below along with recent color photograph. Use one form for each position.

Position		
Personnel information	**Name**	**Date of birth**
	Professional qualifications	
Present employment	**Name of employer**	
	Address of employer	
	Telephone	**Contact (manager/personnel officer)**
	Fax	**E-mail**
	Job title	**Years with present employer**

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company/Project/Position/Relevant Technical and Management Experience

SCHEDULE – E TO BID

SUBCONTRACTORS

Form SUBCON: Proposed Subcontractors/Manufacturers for Major Items of Plant and Services

The following Subcontractors and/or manufacturers are proposed for carrying out the item of the facilities indicated. Bidder shall not propose more than two manufacturers for any major item.

Major equipment/Items of Plant to be supplied

Sr. #	Name of Equipment/ Material		Name of Manufacturer/S	Nationality of Manufacturer	Type/ Designation of proposed Equipment/ Material	Name of Type Testing Laboratory	Type Test Report No.
1.	Equipment/Services as required in Schedule of Prices Schedule-1,2,3 &4						
2.							
3.							
4.							
5.							
6.							

Note:

1. Bidder shall provide the list of all material it is offering along with complete information of manufacturers/ subcontractors.
2. The final selection of the Subcontractor/ Manufacturer for each equipment shall be at the discretion of the Employer.
3. No change of Sub-Contractor shall be made by the Bidder without prior approval of the Employer.
4. The truthfulness and accuracy of the statement as to the experience of Subcontractors is guaranteed by the Bidder. The Employer's judgment shall be final as to the evaluation of the experience of Subcontractors submitted by the Bidder.
5. Statement of similar works shall include description, location & value of work, year completed and name & address of the clients.
6. This may include manufacturer(s) who are proposed here and their relevant details to be provided accordingly including make, capacity and salient

features to make it particularly suitable for the works. The technology used should also be detailed adequately.

7. All other equipment/material not mentioned above shall be supplied in accordance with requirements mentioned in Section 10: Technical Provisions of tender document and relevant NGC specification. The approval of the same shall be sought at detail design stage. In this context the successful bidder shall submit at least two (02) names of manufacturer/subcontractors for the equipment/material not mentioned above for approval by the engineer.

Name of Bidder_____
Signatures of the bidder _____

SCHEDULE – F TO BID

Country of Origin Declaration Form

Name of Bidder _____ Tender Number _____ Page ___ of ___

Item	Description	Country of Origin

SCHEDULE – G-1 TO BID

DEVIATIONS
FROM TECHNICAL PROVISIONS

It is presumed that the bidder shall not take any deviation. However, if he intends to take deviations to the specified terms, those must be listed in the space provided below:

Sr. No.	Clause No. / Section No.	Deviations/Clarifications

[Note**:** Attach additional sheets, if necessary]

Initials of Signatory to Bid:……

SCHEDULE – G-2 TO BID

DEVIATIONS
FROM CONTRACTUAL CONDITIONS

It is presumed that the bidder shall not take any deviation. However, if he intends to take deviations to the specified Contractual/Commercial Conditions, those must be listed in the space provided below:

Sr. No.	Clause No. / Section No.	Deviations/Clarifications

Note: Attach additional sheets, if necessary

Initials of Signatory to Bid:……

SCHEDULE –H TO BID

JV AGREEMENT

THIS LETTER OF INTENT signed on this……. day of…….. Two Thousand and ……..... by……. a company incorporated under the laws of …… and having its Registered Office at ..... (hereinafter called the "Party No.1" which expression shall include its successors, executors and permitted assigns) and M/s……a company incorporated under the laws of…… and having its Registered Office at…… (hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns) and M/s.. .. .. a Company incorporated under the laws of…….. and having its Registered Office at……. (hereinafter called the "Party No.3" which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" {in case of award)] against the Specification No…….for _____ associated with _____ of …….. (hereinafter called the "**Employer**").

WHEREAS the Party No.1, Party No.2 and Party No.3 intend to enter into a Joint Venture Agreement

AND WHEREAS the Employer invited bids as per the above mentioned Specification for the design, manufacture, Supply of Equipment Materials stipulated in the bidding documents under _____ (Lot #) _____ associated with _____.

AND WHEREAS Clause 2, Section-ITB and 'Qualification & Evaluation Requirement of the Bidder'(clause 13, 24 & 25 of ITB), and technical provisions forming part of the bidding documents, inter-alia, stipulates that two or more qualified partners, meeting the requirements of Clause 2, Section-ITB and 'Qualification & Evaluation Requirement of the Bidder'(clause 13, 24 & 25 of ITB), as applicable may bid, provided, they submit a Letter of Intent to enter into Joint Venture Agreement and the Joint Venture Partners fulfill all other requirements under Clause 2, Section-ITB and 'Qualification & Evaluation Requirement of the Bidder'(clause 13, 24 & 25 of ITB), and technical provisions forming part of the bidding documents and in such a case, the Letter of Bid (Technical and Price Bid Form) shall be signed by all the proposed partners so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract by entering into Joint Venture Agreement a per Bidding Forms of the Bidding Documents which will be legally binding on all partners and all obligations hereunder.

The above clause further states that this Letter of Intent shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Employer vide proposal No……..dated…... by Party No.1 based on this Letter of Intent between all the parties; under these presents and the bid , has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Letter of Intent do hereby declare and undertake:

1. In requirement of the award of the Contract by the Employer to the Joint Venture Partners, we, the Parties do hereby undertake that M/s…… the Party No.1, shall act as Lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Employer for the successful performance of the Contract and shall be fully responsible for the design, manufacture, Supply, and successful performance of the equipment in accordance with the Contract for which we shall enter into Joint Venture Agreement as per Bidding Forms of the Bidding Documents which will be legally binding on all partners:

2. If the Contract is awarded to Joint Venture then in case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party(s) will be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.

3. Further, if the Employer suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents will promptly make good such loss or damages caused to the Employer, on its demand without any demur. It shall not be necessary or obligatory for the Employer to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(s), the Employer can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Employer.

4. The financial liability of the Parties of the Deed of Undertaking to the Employer in the event of award of Contract on the Joint Venture, with respect to any of the claims rising out of the performance or non-performance of the obligations set forth in the Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of the Deed of Undertaking.

5. It is expressly understood and agreed between the Parties to this Letter of Intent that the responsibilities and obligations of each of the Parties shall be as delineated in Annexure attached with this Letter of Intent. It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract in the event of award on Joint Venture.

6. It is also understood that this Letter of Intent is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract if awarded and that this Letter of Intent shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Letter of Intent or on the Joint Venture, other than the express provisions of the Contract.

7. This Letter of Intent shall be construed and interpreted in accordance with the provisions of the Contract.

8. In case of an award of a Contract, we the parties to this Letter of Intent do hereby agree that we shall enter into Joint Venture Agreement as per Bidding Forms of the Bidding Documents which will be legally binding on all partners and we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favour of the Employer in the currency/currencies of the Contract.

9. It is further agreed that this Letter of Intent shall be irrevocable and shall form an integral part of the bid. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Letter of Intent have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of ……
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated …….

For Lead Partner (Party No.-1)
For and on behalf of M/s
……..

Name ……..
Designation …….

Signature …….

(Signature of the authorized representative)

WITNESS :

I. ……

II. ……

Common Seal of ……
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated …….

For Party No.-2
For and on behalf of M/s……..

Name ……..

(Signature of the authorized representative)

Designation …….

Signature …….

WITNESS :

I. ……

II. ……

Common Seal of ……. has been affixed in my/ our presence pursuant to Board of Director's Resolution dated …….

For Party No.-3
For and on behalf of M/s.
……..

Name ……..

Designation …….

Signature …….

(Signature of the authorized representative)

WITNESS :

I. ……
II. ……

Notes:

1. In the event that the successful Bidder is a joint venture formed of two or more companies, the Employer requires that the parties to the joint venture accept joint and several liabilities for all obligations under the Contract.
2. The maximum number of J.V. partners is three (3).

(In the event that the successful Bidder is a joint venture formed of two or more companies, the Employer requires that the parties to the joint venture accept joint and several liabilities for all obligations under the Contract.)

SCHEDULE –I TO BID

Equipment

The Bidder shall provide adequate information and details to demonstrate clearly that it has the capability to meet the equipment proposed to be used in carrying out the Works at Site, including number of each kind, make, type, capacity of all equipment, working condition, which shall be deployed by him for Civil Work and Erection, Testing and Commissioning of the Works including requirements indicated in Technical Provisions, using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

Item of Equipment		
Equipment Information	**Name of manufacturer**	**Model and power rating**
	Capacity	**Year of manufacture**
Current Status	**Current location**	
	Details of current commitments	
Source	**Indicate source of the equipment** ☐ **Owned** ☐ **Rented** ☐ **Leased** ☐ **Specially manufactured**	

Omit the following information for equipment owned by the Bidder.

Owner	**Name of owner**	
	Address of owner	
	Telephone	**Contact name and title**
	Fax	**Telex**
Agreements	**Details of rental/lease/manufacture agreements specific to the project**	

Schedule – K TO BID

UNDERTAKING OF ACCEPTANCE OF AND COMPLIANCE WITH THE SOP FOR BLACKLISTING OF CONTRACTORS

A) I, _____ *[insert name and position of authorized signatory],* being duly authorized by _____ *[insert name of the Bidder/members of joint venture ("JV") in case the Bidder is a JV]* (hereinafter referred to as the "Bidder") to execute this Undertaking of Acceptance of and Compliance with the NGC SOP for Blacklisting of Contractors attached herewith (hereinafter referred to as the "SOP"), hereby certify on behalf of the Bidder that we, _____*[insert name of the Bidder]* have read and accept the provisions of the SOP.

B) I further certify, on behalf of the Bidder, that:

(i) this Bid has been prepared and submitted in full compliance with the terms and conditions set forth in the SOP;

(ii) we have not, directly or indirectly, taken any action which is or constitutes inter alia a corrupt, fraudulent, collusive or coercive act or practice in violation of the SOP; and

(iii) we shall continue to comply with the terms and conditions of the SOP as and when amended, during period of evaluation of Bids and, in case we are selected for award of Contract, upto satisfactory completion of the Contract.

_____

Authorized Signatory
For and on behalf of *[insert name of the Bidder]*
Date:

Schedule-L to Bid

MANUFACTURER'S AUTHORIZATION

Date: _____

Bid Reference No.: _____

To: _____
(Name of Employer)

WHEREAS we_____ who are official Manufacturer of _____ (name & description of Goods offered) having factories at (address of factory)_____ do hereby authorize M/s _____ (Name and address of Bidder) to submit a Bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods manufactured by us and to subsequently negotiate and sign the Contract:

Description of Goods: _____

_____

_____

We hereby extend our full guarantee and warranty in accordance with Clause 1.1.11 of the General Conditions of Contract, with respect to the Goods offered by the above firm in reply to this Invitation for Bids

Name: _____

In the capacity of: _____

Signed: _____

Duly authorized to sign the Authorization for and on behalf of _____
(Name of Manufacturer)

Date: _____

Note: This letter of authority should be on the letter head of the Manufacturer and should be signed by a person competent and having the Power of Attorney to legally bind the Manufacturer.

Schedule-M to Bid

Undertaking for Type Testing

"We, M/s. _____ [*Name of the Bidder*] undertake to submit type test reports conforming to the Specifications - Technical Provisions of the Bidding Document. In case the submitted type test reports (with the Bid or after award of Contract) are not conforming to the requirements of NGC [*Specifications - Technical Provisions*] and NGC Type Test Policy the Bidding Document and , we shall arrange the type tests specified in Volume-II [*Specifications – Technical Provisions*] in accordance with the provisions of the Bidding/Contract Document at no additional cost to the Purchaser and without affecting the stipulated Delivery Period.

Signature & Seal of the Bidder"

FORM/LETTER OF PRICE BID
AND
SCHEDULES TO BID

Form of Price Bid

Schedules to Bid

- Schedule J to Bid: Integrity Pact

SCHEDULE OF PRICES

- Preamble to Schedule of Prices
- Schedule of Prices

LETTER OF PRICE BID

Bid Reference No.: ……
Package No.: ……

……..
……. ……
[Name of Works]

To:
……
……
……

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, Schedules to Bid, Schedule of Prices and Addenda Nos. ……. for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address …… ……. and being duly incorporated under the laws of …….. hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price comprising of Local Currency Component of Pak Rupees ……..….. (Rs. …….) or such other sum as may be ascertained in accordance with the said Documents.

2. We understand that all the Schedules attached hereto form part of this Bid.

3. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.

4. We agree to abide by this Bid for the period of ……. days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

6. We undertake, if our Bid is accepted to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.

7. We understand that you are not bound to accept the lowest or any Bid you may receive.

8. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.

9. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid from a single firm).

Dated this ……. day of …….. 2021…

Signature …….. in the capacity of ……duly authorized to sign the Bid for and on behalf of ……
(Name of Bidder in Block Capitals)

(Seal of Bidder)

Bidder's Address
……
……

Witness:

Signature: …….
Name: ……
Address:
……
……
Occupation ……

SCHEDULE – J TO BID

(INTEGRITY PACT)

[To be filled and signed by the Bidder]

DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC. PAYABLE BY THE SUPPLIERS OF GOODS, SERVICES & WORKS IN CONTRACTS WORTH RS. 10.00 MILLION OR MORE

Contract No._____ Dated _____
Contract Value: _____
Contract Title: _____

…… [Name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GoP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GoP through any corrupt business practice.

Without limiting the generality of the foregoing, [name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[name of Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, [name of Supplier] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Name of Buyer: …… Name of Seller/Supplier: ……
Signature: …… Signature: ……
[Seal] [Seal]

SCHEDULE OF PRICES

SCHEDULE OF PRICES

	Description
1.	Preamble to Schedule of Prices
2.	Schedule of Prices

1. PREAMBLE TO SCHEDULE OF PRICES

1. General

1.1 The Schedule of Prices shall be read in conjunction with the Conditions of Contract together with Section-9 (Special Provisions) and Section-10 (Technical Provisions) including all documents referred therein.

1.1 The Contract shall be for the whole of the Works on EPC/Turnkey basis as described in these Bidding Documents. Bids must be for the complete scope of Work.

1.2 The Works shall be fit and sufficient for the purpose(s) for which they were intended as were expressly made known to the Contractor or could reasonably have been inferred by it.

2. Description

2.1 Price given in the Schedule of Prices against each item shall be for the scope covered by that item as detailed in Section-9 (Special Provisions), Section-10 (Technical Provisions), the Specifications, Bid Drawings or elsewhere in the Bidding Documents. The general directions and descriptions of work and materials are not necessarily repeated nor summarized in the Schedule of Prices and do not generally give a full description of the Plant and equipment to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the relevant sections of the Bidding Documents to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices against each item in Schedule of Prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.

The Schedule of Prices only identifies major components of the structure and it does not restrict the responsibility of the Contractor to furnish all equipment, materials and services as deemed necessary by the Employer/Engineer for making the structure operationally complete and satisfactory as specified and/or implied in the Bidding Documents and subsequent revisions thereto.

2.2 If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with clause IB 6 prior to submitting their bid.

2.3 The quantities shown in the Schedule of Prices are estimated quantities only as an indication of the Scope of Work to enable the bidder to bid for different items of the Works for his estimate of costs. The estimated quantities shall be used for comparing the bids. It is, however, to be noted that in the event of any increase or decrease in the quantity of any item of Works and subject to provisions of the Conditions of Contract herein, the actual quantities executed and measured

by the Contractor and verified by the Engineer will be paid.

2.4 The sizes & dimensions mentioned and/or specified in the various technical descriptions and specifications including Bid Drawings are tentative and not final as the responsibility for detailed design rests with the Contractor under the Contract. If, in the opinion of the Engineer, at the time of review of Contractor's drawings/designs for approval, certain sizes & dimensions of some items have to be increased for proper completion and/or operation of the Works, then revised sizes & dimensions shall be supplied by the Contractor at no extra cost to the Employer.

3. Units & Abbreviations

3.1 Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the Systeme Internationale d' Unites (SI Units).

The following abbreviations shall be used in the Schedule of Prices:

	Abbreviation
Foreign Currency Component	FCC
Local Currency Component	LCC
United States Dollars	US$
Pakistani Rupees	PKR/Rs
Number	No.
Kilometer	km
Kilogram	Kg
Cubic Meter	Cu.m
Provisional Sum	PS
Percent	%
Quantity	Qty

4. Rates and Prices

4.1 Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the work set forth or implied in the Contract; except for the amounts reimbursable to the Contractor under the Contract.

4.2 Unless otherwise stipulated in the Conditions of Contract, the rates and prices entered by the bidder shall not be subject to adjustment during the performance of the Contract.

4.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date twenty-eight (28) days prior to the deadline for submission of bids shall be included in the rates and prices and

the total Bid Price submitted by a bidder.

Additional/reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed/ deducted as per provisions of the Conditions of Contract.

4.4 The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Schedule of Prices, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made for those items.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Any item against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates and prices for other items in the Schedule of Prices.

If any item is quoted in both Schedule-1 and Schedule-2, the cost of that item shall be considered as an aggregate of both the prices.

4.5 The bidder shall be deemed to have obtained all information as to port clearance facilities and charges, loading and unloading facilities and charges, storage facilities and charges, transportation facilities and charges, congestion and/or other conditions to be expected at Karachi Port and or any other seaport of Pakistan and all requirements related thereto.

4.6 The Contractor shall be responsible to make complete arrangements for the transportation of the Plant to the Site. Contractor shall also be responsible for arrangement of all consumable materials for execution of works within the prices quoted in Price schedules/BoQ.

The bidder shall be deemed to have included all clearing, forwarding and other incidental costs in this regard in his bid. The Contractor will have the option to use either Karachi Port or any other seaport of Pakistan.

The Contractor shall provide for all parts of the Works to be completed in every respect for commercial operation. Notwithstanding that any details, accessories, etc. required for the complete installation and satisfactory operation of the Plant, are not specifically mentioned in the Specifications, such details shall be considered as included in the Contract Price.

(Note: _ The transportation of spare serviceable material from site to NGC's designated store / warehouse after completion of the project may also be included in bidder's scope).

5. Bid Prices

5.1 Break-up of Bid Prices:

The various elements of Bid Prices shall be quoted as detailed below:

A) CIP (Project's Site) Price

CIP (Project's Site) Price will be the total of CIF and inland transportation

CIF (Pakistan Seaport) Price

CIF (Pakistan Seaports) price will be the total of CFR price and insurance price, described as under:

a) CFR Port of Shipment

The bidder shall quote prices for CFR Port of Shipment for all individual items and for each sub-total of Plant, Erection Equipment and Spare Parts to be supplied from outside Pakistan on CFR (Port of Shipment) basis. The CFR Port of Shipment price shall include the cost of the following:

i) Design, manufacture, finishing, factory testing, packing for transport and all transportation costs incurred in placing the Plant, Erection Equipment and Spare Parts and other materials on board the vessel.

ii) Provision of clean on-board bills of lading.

iii) Export taxes, fees or charges levied on exporting Plant, Erection Equipment and Spare Parts and other materials in the country of origin, and all direct taxes levied in Pakistan (except custom duties as mentioned in Clause 5.1 (B)) in the case of Plant imported to Pakistan.

iv) Provision of certificates of origin, consular invoices (if required) or any other documents issued in the country of origin.

v) Shipping:
The bidder shall quote prices for shipping from port of shipment to the port of entry in Pakistan for the sub-totals of the Plant, Erection Equipment, Spare Parts and other materials to be imported for the Contract in Pakistan. Such prices shall include all marine transportation costs including

ocean freight and other charges, etc.

The prices for shipping/marine transportation shall be quoted for shipment through reputed shipping lines including Pakistan National Shipping Corporation (PNSC).

Cost of shipment(s) effected by the Contractor at his option by aircraft shall be deemed to be included in the Total Bid Price.

b) Insurance

The bidder shall quote prices for insurance cover from ex-factory/ ex-works to the Site for the sub-totals of the Plant, Erection Equipment, Spare Parts and other materials to be imported for the Contract. Such prices shall include all insurance costs covering the responsibility for all loss or damages while loading, unloading, storing and trimming on board or on inland carrier and transportation to Site. This , includes but is not limited to war risks, strikes, riot and civil commotion (SRCC), fire, smoke, explosion, terrorism, collision, overturn, derailment, flood, theft or attempted theft.

All insurance cover shall be affected with National Insurance Company Limited (NICL), Pakistan as per Clause GCC 43.12.

B) Customs Duties

Customs duty for Plant, Erection Equipment, Spare Parts and other materials, if any, offered from outside Pakistan shall include customs duties and other indirect taxes paid or payable in relation to clearance of Plant from port. Bidder will give breakup and Employer will pay the Custom Duties.

C) Ex-factory Price for Local Goods

The bidder shall quote prices for Local Goods, materials (other than materials required for civil works such as concrete and reinforcement etc. Cost of which will be included in the price of civil works), spare parts and equipment in the relevant column of EXW (Pakistan) of "Schedule of Prices". Such prices shall include:

i) Design documentation, drawings, drafting, planning services, manufacturing, testing and packing of finished goods ready for delivery to Site.
ii) All custom duties, sales tax and other taxes already paid or

payable on the components and raw materials used in the manufacture or assembly of Local Goods, materials and equipment.

iii) Insurance of Local Goods and other materials from factory to Site including all insurance costs covering the responsibility of all losses or damages, while loading, unloading, storing, trimming on the carrier and transporting to Site. Checking and verifying of consignments, issuance of receiving reports and damage reports (when applicable) shall be the Contractor's responsibility. The insurance shall be affected with National Insurance Company (NIC) of Pakistan as per Clause GCC 43.12.

D) Local Transport

Inland transportation for the Plant, Erection Equipment and Spare Parts shall be the Contractor's responsibility in respect of:

i) the Plant, Erection Equipment, Spare Parts and other materials offered from outside Pakistan; from the port of entry in Pakistan to the storage area at the Site, and

ii) indigenous Plant, Erection Equipment, Spare Parts and other materials if any, offered from within Pakistan; from the factory in Pakistan to the storage area at the Site, and all charges occurring therefrom including octroi, zila tax, fees etc. and charges for loading, forwarding and unloading expenses shall be borne by the Contractor. Unloading at the Site, handling of the Plant, Erection Equipment, Spare Parts and other materials to the designated point of Site storage, checking and verifying all shipments received against shipping documents, issue of all receiving reports and issues of damage reports (when applicable) shall be the Contractor's responsibility.

iii) Plant, Erection Equipment, Spare Parts and other materials spared after completion of works from the Site/Designated Storage Yard to the NGC designated Warehouse (Faisalabad, Lahore, Jamhsoro & Multan), and all charges occurring therefrom including octroi, zila tax, fees etc. and charges for loading, forwarding and unloading expenses shall be borne by the Contractor. Unloading at the Warehouse, handling of the Plant, Erection Equipment, Spare Parts and other materials, checking and verifying all equipments/inventories against material re-conciliation reports, issue of all receiving reports and issues of damage reports (when applicable) shall be the Contractor's responsibility. All Coordination in allocation and handing over of material will be carried out through Project

Manager/Engineer.

The bidder shall recognize such elements of the costs which he expects to incur in the performance of the Works and shall include all such costs in the rates and amounts entered in the Schedule of Prices including all taxes.

E) Installation & Other Services

The bidder shall quote prices for Installation & Other Services for the sub-totals of the Plant at the Site. Such prices shall include the costs of handling of the Plant and other materials from Site storage to point of final installation, erection, installation, testing, commissioning including all inspection, reliability tests, the cost of foreign and local erection staff and labour, tools and equipment, etc. It shall also cover the services of qualified representative(s) of the supplier(s) of Plant or adviser(s) to assure proper erection and commissioning of the Plant. The price shall also include cost of arranging insurances in respect of Contractor's operations in Pakistan which insurances shall be effected by the Contractor with the National Insurance Company (NIC) of Pakistan in accordance with GCC 43.12. The price shall also include all direct taxes. Provincial taxes and other indirect taxes shall be quoted separately.

5.2 Total Bid Price

The total of bid prices under foreign currency and local currency columns in the Schedule of Prices shall be entered in the Summary of Bid Prices. The unit rates and prices and lumpsum amount entered in the Schedule of Prices will be the rates at which the Contractor will be paid, and shall be deemed to be the full inclusive value of the work including all costs of performing the Works such as overheads, income tax, super tax, profits, costs of accepting the general risks, liabilities and obligations set forth or implied in the Contract except for the amounts reimbursable, if any, to the Contractor under the Contract. The rates shall also include Contractor's cost for providing Performance Security and other Bank Guarantees required for performance of the Contract.

Note: A breakup of lumpsum prices will be provided by the bidder alongside the bid. Such Breakup shall not alter the treatment of the lumpsum items during evaluation/award but will provide a reference for future valuations/determinations during Contract execution Stage

6. Spare Parts

6.1 In the Schedule of Prices, under Spare Parts, the Employer has drawn up a list of spare parts along with estimated quantities. For Spare Parts to be supplied from outside Pakistan, the bidder shall enter the CIP price for all individual

items breaking up the price into CIF (CFR Port of Shipment, Shipping to wharf at the port of entry in Pakistan, Insurance to Site) and Local Transport in Pakistan against each sub-total. For Spare Parts to be supplied from within Pakistan, EXW price (including insurance to Site) and local Transport in Pakistan, etc. shall be entered. These spare parts shall be furnished and the cost included in the Bid Price.

The Employer shall have the option of ordering additional quantities of these essential spare parts, at the unit rates entered in the Schedule of Prices, no later than one year after the Commencement Date.

The unit rate for any item shall be computed by dividing the total amount by the quantity of that item.

6.2 The Bidder shall also list in the space provided in the Schedule of Prices (Schedule No. 6) any Spare Parts which he recommends be provided for the Works, in addition to those specified by the Employer in the Schedule of Prices. The Bidder shall enter against each such item, its recommended quantity, rate and price. The cost of such Additional Recommended Spare Parts will not be considered in the evaluation of bids.

The Additional Recommended Spare Parts may be selected by the Engineer/ Employer and the Contract Price will be adjusted in accordance with the prices set against those items in the Schedule of Prices.

8. Reimbursable Costs

8.1 If provided in the Particular Conditions of Contract, the Contractor shall be reimbursed the actual amounts (without any overhead charges and profits) disbursed by him in respect of non-exempt Pakistani customs, import duties, and taxes, levied upon Plant, Erection Equipment and Spare Parts imported directly by him or his subcontractors into Pakistan for the purpose of this Contract for incorporation in the Works.

8.2 The bidder shall recognize such elements of the costs which he expects to incur in the performance of the Works and which are reimbursable, and he shall not include any such costs in the rates and amounts entered in the Schedule of Prices.

9. Provisional Sums

9.1 Provisional Sums included and so designated in the Schedule of Prices if any, shall be expended in whole or in part at the direction and discretion of the Employer/ Engineer. The Contractor will only receive payment in respect of Provisional Sums if he has been instructed by the Employer/Engineer to utilize such sums.

Schedules of Rates and Prices

Schedule No. 1- Plant and Mandatory Spare Parts Supplied from Abroad

Item	Description	Country of Origin	Unit	Qty	Unit Price (CIF Pakistan Seaport)		Total Price (CIF Pakistan Seaport)1		Total Inland Transportation	Total Price CIP (Project Site)		Taxes & Duties
					CFR	Insurance	CFR	Insurance		FCC	LCC	Local Currency
1	2	3	4	5	6	7	8=5 x 6	9 = 5 x 7	10	11=8	12= 9+10	13
I	**500/220kV Ludewala Grid Station**											
A	**Transformers**											
1.	**525/√3/231/√3/23 kV Auto Transformer Bank**											
1.1.	525/√3/231/√3/23 kV, 250x3 MVA, Auto-Transformer Bank, complete with indoor & outdoor control cubicles, Marshaling Kiosk, bushings having extended creepage distance(31mm/kV), terminal connectors, MR Germany or equivalent make OLTC, Surge Arrestors for Tertiary winding, out of delta CT for tertiary winding, Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA and all other equipment and accessories as specified.		Set	2								
1.2	525//3/231//3/23 kV, 250 MVA, Spare Auto-Transformer Unit complete with outdoor control cubicles, bushings having extended creepage distance(31mm/kV), terminal connectors, MR Germany or equivalent make OLTC, Surge Arrestors for Tertiary winding, Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA and all other equipment and accessories as specified.		No.	1								
1.3	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for transformer bank, complete with all		Set	2								

	equipment and accessories as specified and with separate OGST for each transformer unit (i.e 3 Nos. OGST for each Transformer Bank).											
1.4	Insulated bus bar (DURESCA make or equivalent) 4000A, 52kV for interconnection of tertiary bushings to form delta connection of tertiary windings of each auto-transformer bank, as specified, including steel protection box (for enclosing the tertiary bushings & surge arresters for tertiary windings) and all the accessories, attachments, fittings, fastenings, connectors, conductors, hardware, earthing materials etc. as required to complete the tertiary windings interconnections and surge arresters installation in all respects.		Set	2								
1.5	Neutral bus bar complete arrangement including but not limited to aluminum tubular conductor, post insulators with structures, all type of connectors etc. for **Auto Transformer Bank**.		Set	2								
	Sub Total of Item A	**-**	-	**-**	**-**	**-**	-	**-**	**-**			
B.	**550/√3kV Shunt Reactor Bank**											
1.	550/√3 kV,3x37 MVAR (at 500 kV) Shunt reactor Banks complete with local control cubicles, bushings having extended creepage distance(31mm/kV), Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA, terminal connectors and all other equipment and accessories as specified.		Sets	5								
2.	550/√3 kV,37 MVAR (at 500 kV) Single Phase Spare Shunt reactor unit with local control cubicles, bushings having extended creepage distance(31mm/kV), Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA, terminal connectors and all other equipment and accessories as specified.		No.	3								
3.	Marshaling Kiosks for Shunt Reactor banks.		No.	5								
4.	Neutral bus bar complete arrangement including but not limited to aluminum tubular conductor, post insulators with structures, all type of connectors etc. for two Shunt Reactor Banks and one spare unit.		Lot	5								
5.	Indoor auxiliary control Panel for shunt reactor banks with allied accessories.		No.	5								
6.	Nitrogen injection explosion		Set	5								

	prevention and fire protection system (Sergi France or equivalent) for Shunt Reactor bank, complete with all accessories as specified and with separate OGST for each Shunt Reactor unit (i.e 3 Nos. OGST for each Shunt Reactor Bank).											
7.	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for Shunt Reactor single unit, complete with all accessories as specified and with separate OGST.		No.	3								
8.	Bank Selector Kiosk		No.	3								
9.	Any other equipment/material required to make shunt reactor banks, transfer bus and firefighting system operational.		Lot	1								
	Sub Total of Item B	-	-	-	-	-	-	-	-			
C.	**500kV Switch Yard Equipment**											
1.	Circuit Breaker SF6 Gas type, three pole, 550kV 3150A, 50kA 1 sec, with pre-insertion resistors, grading capacitor, busing having extended creepage distance(31mm/kV), 220V DC operating mechanism with local control cubicle, terminal connectors, steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.		Set	16								
2.	Bus Disconnector (without earthing switch), three pole, 550 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.		Set	29								
3.	Line Disconnectors (with earthing switch), three pole, 550 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.		Set	5								
4.	550 kV, 50kA(1-sec), single pole, 3000-2500:2000:1250:750/1A ratio, 5 core Current Transformers, cores having tapping (VA burdens 15,30,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage		No.	33								

	distance(31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.											
5.	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box (1 for each set of 3 No. CVTs), steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.		No.	18								
6.	Coupling Capacitor voltage transformer (CCVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, with carrier coupling accessories, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.		No.	10								
7.	Surge Arrestors 444 kV, 50kA, Single Pole with bushings having extended creepage distance(31mm/kV), terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.		No.	39								
8	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied accessories as per IEC 60273 & IEC 60168 and all other allied equipment & accessories as specified.		No.	116								
	Sub Total Item C	-	-	-								
D.	**500kV High Voltage Bus Work**											
1.	**String Assemblies**											
1.1	500 kV Double Tension String Assembly for 3×810mm^2 and 4×810mm^{2}Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, Extension/Jumper terminal, 160kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.											
	with turn buckle		Lot	1								
	without turn buckle		Lot	1								
1.2	500 kV Double Suspension String Assembly (V Type) for 3×810mm^2 and		Lot	1								

	4×810mm² Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, 160 kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.											
2.	**Overhead Flexible Conductors**											
2.1	810 mm² Coreopsis Conductor as specified.		Lot	1								
3.	**Aluminum Tubular Conductor**											
3.1	Aluminum tubular conductor for connection between switchyard equipment as specified.		Lot	1								
4.	**Connectors, Hardware & Accessories**											
4.1	For 810 mm² Coreopsis Conductor as specified.		Lot	1								
4.2	For Aluminum tubular conductor of connection between switchyard equipment as specified.		Lot	1								
5.	**Steel Structure support 500kV Overhead Busses**											
5.1	**Beams**											
5.1.1	32m, Type V1 (Triple Coreopsis Conductor)		No.	5								
5.1.2	32m, Type V2 (Triple Coreopsis Conductor)		No.	15								
5.1.3	32m, Type V2X (Triple Coreopsis Conductor)		No.	5								
5.1.4	33m, Type V3G (Quad Coreopsis Conductor)		No.	16								
5.2	**Column**											
5.2.1	(30.75+9.25)m, Type C1(Triple Coreopsis Conductor)		No.	6								
5.2.2	(20+10.75+9.25)m, Type C3 (Quad Coreopsis Conductor)		No.	12								
5.2.3	(20+10.75+9.25)m, Type C3X (Quad Coreopsis Conductor)		No.	06								
5.2.4	20m, Type C4 (Quad Coreopsis Conductor)		No.	11								
5.2.5	(20+10.75+9.25)m, Type C5 (Triple Coreopsis Conductor)		No.	06								
5.2.6	18 m, (for Shunt Reactor transfer Bus Support)		No.	04								
	Sub Total Item D	-	-	-								
E.	**500kV Control, Protection & Metering System**											
1.	**Relay Panels**											
1.1	500 kV Line Distance Protection Relay Panel R11– Set-I as specified in Clause No. 1.11.1 of NGC Specifications P204:2025.		Nos.	05								
1.2	500 kV Line Distance Protection Relay Panel R12– Set-II as specified in Clause No. 1.11.2 of NGC Specifications P204:2025.		Nos.	05								
1.3	500/220 kV Auto Transformer Protection Relay Panel R13– Set-I as		Nos.	02								

	specified in Clause No. 1.11.3 of NGC Specifications P204:2025.											
1.4	500/220 kV Auto Transformer Protection Relay Panel R14– Set-II as specified in Clause No. 1.11.4 of NGC Specifications P204:2025.		Nos.	02								
1.5	500 kV Breaker Failure Protection Panels R15 as specified in Clause No. 1.11.5 of NGC Specifications P204:2025.		Nos.	04								
1.6	Trip Circuit Supervision Relay Panel Type R16 with 18 Nos. TCS of 220VDC as specified in Clause No. 1.11.6 of NGC Specifications P204:2025.		Nos.	04								
1.7	Bus Bar Protection Panels R17b for 500 KV Bus Bar I & II with Centralized type Low Impedance Busbar Protection relays covering 04 no. 500kV Dias and at least four (02) Nos. 500kV Future Dias. as specified in Clause No. 1.11.8 of NGC Specifications P204:2025.		Sets	02 i.e., 01 Set each for Bus Bar-I & Bus Bar-II								
2.	**Control Panels and Local Control Cubicles**											
2.1	500 kV Control Panel WCA2 for Line + Line Dia with BCUs and Mimic Control for One & a Half Breaker Scheme as specified in Clause No. 5.16.3 of NGC Specifications P204:2025.		Nos.	02								
2.2	500 kV Control Panel WCA1a for Line + Transformer Dia with BCUs and Mimic Control for One & a Half Breaker Scheme as specified in Clause No. 5.16.1 of NGC Specifications P204:2025.		Nos.	02								
2.3	500 kV Combined Protection & Control Panel WRCA20 for Shunt Reactor with BCUs and Mimic Control as specified in Clause No. 5.16.7 of NGC Specifications P204:2025.		Nos.	05								
2.4	Local Control Cubicles for 500 kV T/Line side Breakers S1 (as per site work-scope requirements) as specified in Clause No. 3.21.10 of NGC Specification P204:2025.		Nos.	05								
2.5	Local Control Cubicles S2 for 500 kV Transformer side Breakers (as per site work-scope requirements) as specified in Clause No. 3.21.11 of NGC Specification P204:2025.		Nos.	02								
2.6	Local Control Cubicles for 500 kV Middle Breakers S3 (as per site work-scope requirements) for line-line Dia as specified in Clause No. 3.21.12 of NGC Specification P204:2025.		Nos.	04								
2.7	Local Control Cubicles for 500 kV Shunt Reactor side Breakers S4 (as per site work-scope requirements) as specified in Clause No. 3.21.13 of NGC Specification P204:2025.		Nos.	05								

2.8	**SAS / SCADA Equipment at Ludewala**											
2.8.1	Design, Manufacture and Supply of Standalone Gateway Server in 1+1 configuration with firewall along with cubicle for Gateway Equipment having dimension 2200x800x600, RAL7031 Color fitted with thermostat, hygrometer, Cooling Fan, lightening lamp etc. at 500KV G/S Ludewala as per NGC'S Gateway specifications such that fully functional with the SAS and remote end SCADA systems at NPCC Islamabad and BCC Jamshoro. All other miscellaneous and necessary items such as auxiliary relays, fans, MCBs, ELCB, links, terminals, test points, wiring, earthing, brass cable glands, FO cable glands, FO cables and connectors, lugs, ferrules, labels, power sockets, heater, humidity sensor, internal light to complete the scheme and installation.		Set.	1 set (2 Gateway server with firewall & 2 Cubicles								
3.	**Miscellaneous Panels**											
3.1	Fault Recorder Set of Panels for 500 & 220(for subject scope and for at least 04 nos. future line bays and 02 nos. transformer bays) systems as per Clause No. 3.24.1 & 3.24.2 of NGC Specifications P-204:2025		Set	01 complete set of Panels								
3.2	Fiber Optic Patch/Routing Panel(s) Set I type FOP1a as specified in Clause No. 5.19.1 of NGC Specification P204:2025.		Set	01 complete Set of Panels								
3.3	Fiber Optic Patch/Routing Panel(s) Set II type FOP2a as specified in Clause No. 5.19.2 of NGC Specification P204:2025.		Set	01 complete Set of Panels								
3.4	Station Level Interfacing Panel Set I type SLI1 as specified in Clause No. 5.19.3 of NGC Specification P204:2025.		Nos.	01								
3.5	Station Level Interfacing Panel Set II type SLI2 as specified in Clause No. 5.19.4 of NGC Specification P204:2025.		Nos.	01								
3.6	Common BCU & Synch Panel for 500 kV system type CC2 as specified in Clause No. 5.19.6 of NGC Specification P204:2025.		Nos.	01								
3.7	Common BCU & Synch Panel for 220 kV system type CC3 as specified in Clause No. 5.19.7 of NGC Specification P204:2025.		Nos.	01								
3.8	As per NGC Specification P-204:2025 clause 5.4.5.10 Operator Workstation of Fan less Industrial Grade IEC61850-		Set	02								

	3, IEC61850 ed.2 and IEC62439-3 PRP compliant latest model processors along with; LED monitors (at least 30"), keyboard, mouse, UPS & allied accessories, printers, LAN Network, furniture stuff etc. in the light of technical provision & provided concept diagram.											
3.9	As per NGC Specification P-204:2025 clause 5.4.5.10 Engineering Workstation of Fan less Industrial Grade, IEC61850-3, IEC61850 ed.2 and IEC62439-3 PRP compliant latest model processors; LED monitors (at least 30"), keyboard, mouse, UPS & allied accessories, printers, LAN Network, furniture stuff etc. in the light of technical provision & provided concept diagram.		Set	01								
3.10	Large wall-mounted display along with all allied accessories, cables, etc. (at least 103") as specified NGC Specification P204:2025.		Set	01								
3.11	Latest version complete licensed SAS software & licenses along-with allied accessories/dongles for engineering & redundant operating workstations and servers (Licensed Software/dongles for configuration & testing/commissioning of complete SAS shall also be provided)		Set	01								
3.12	Colored Laserjet Network printer along-with associated LAN and all allied accessories		Nos.	02								
3.13	Alarm & Events Printer and Hard Copy Unit along with all allied accessories		Set	01								
3.14	Single core & Multi cores FO shielded cables as per relevant IEC standards along with allied accessories (including accessories for terminations/connections) & any other FO cables etc. for connections between Bay level and Station level equipment (s) / Ethernet switches / IEDs etc. as per scheme requirement/SAS concept diagram with 30% spare fibers in each multi core FO cable to make SAS functional. Each multi-core FO cable will be connected via. Optical Distribution Frames before connecting to any equipment/IEDs.		Lot	01								
3.15	As per NGC Specification P-204:2025 clause 5.4.5.11 Branded Laptop Computer (HP/Dell/Lenovo or equivalent) of following or higher specification: Processor: Core i7-Latest Generation Graphics: Integrated AMD (min dedicated 4GB GDDR5) RAM: 16GB DDR4 Solid State Drive: 1 TB SSD LED:15.6"		Nos.	02								

	Operating System: Windows 10 Professional (64 bit) Along with battery charger, UPS, Bag, cable, Drivers CDs, all type of engineering workstation, Servers, Gateways, SAS/IEDs licensed soft wares /dongles, configuration software/dongles, testing & commissioning software, etc. & Cables / Converters for Communication & tests with Protection Relays, Metering Equipment, FR, BCUs, server computers, Local SCADA/HMI, SAS Equipment(s) etc. Note: 01 no. Laptop for field formations and 01 no. Laptop for o/o DG (P&C ENGINEERINGE) NGC for setting, configuration & design work etc.											
3.16	All misc. equipment/material / panels not listed above but required for proper operation of protection, control, automation etc. equipment along with all allied schemes as specified in relevant NGC specifications and sample SAS concept diagram.		Lot	01								
3.17	All other necessary material/devices/relays/cables (i.e., tripping Relays, Auxiliary Relays, Contactor Relays, AC/DC MCBs, Terminal Blocks etc.,) required for proper operation/, integration of applicable scope of works (i.e., 220 kV Busbar Protection Scheme, 220 kV Breaker Failure Protection Scheme, Common Alarms Scheme, AC/DC Auxiliary Supply System etc., schemes) with existing system as per actual site requirements.		Lot	01								
4.	**Metering Panel**											
4.1	Metering panel 4-Line (without AC Power Transducers and paperless recorder) with four(4) Energy meters (accuracy class 0.2S) for 500kV Auto Transformer Bank & T/Line metering as per NGC specifications P-199:2008 and P202:2012 amended to date.		No.	2								
	Sub Total Item E	**-**	-									
F.	**AC & DC Auxiliary Supply System for 500kV Equipment**											
1.	415/230V AC-I & II Auxiliary Supply Panels for 500 kV System with both manual and automatic changeover facility plus automatic transfer switch for Diesel Generator as per requirement laid down in Employer's requirements and enclosed concept diagram.		Set	01 complete Set of Panels								

2.	220V DC-I & II Auxiliary Supply Panels for 500 kV system with both manual & automatic change over facilities along-with DC emergency Busbars-I & II as per requirements laid down in Employer's Requirements and Concept Diagram.		Set	01 complete Set of Panels								
3.	Inverter Panel(s) (consists of 6 kVA 220V DC / 230V AC, single phase, 50Hz AC Sine wave Inverters having 10 Nos. 6A, 10kA MCBs with each inverter) with Automatic & Manual Changeover facilities in the light of provided concept diagram.		Nos.	02								
4.	Lead acid battery bank, 220V, 600AH(minimum) complete with accessories as specified.		No.	2								
5.	Automatic static battery charger 220V, 100A(minimum) complete with accessories as specified.		No.	2								
	Sub Total Item F	-	-									
G.	**Telecommunication Equipment**											
A	**DESIGN, MANUFACTURE, SUPPLY OF TELECOM EQUIPMENT.**											
1	**DIGITAL POWER LINE CARRIER (DPLC) Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Chashma-5 on Circuit-1.**											
1.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
1.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
1.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.		Meter	1000								
1.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network,		No.	01								

	programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.											
1.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit		No.	01							

	breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48V DC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
1.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system		Lot	01								
2	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Chashma-5 on Circuit-2.**											
2.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel		No.	02								

	Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.											
2.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
2.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.		Meter	1000								
2.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions		No.	01								

	specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.											
2.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and		No.	01							

	commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
2.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system		Lot	01								
3	**DIGITAL POWER LINE CARRIER (DPLC) Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Chashma-5 on Circuit-3.**											
3.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
3.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
3.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.		Meter	1000								
3.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8		No.	01								

	coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.											
3.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC		No.	01							

	input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
3.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system		Lot	01								
4	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture, Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Faisalabad West on Circuit-1.**											
4.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC		No.	02								

	Specifications and IEC 60353.											
4.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
4.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.		Meter	1000								
4.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and		No.	01								

	Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.											
4.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and		No.	01							

	installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
4.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system		Lot	01								
5	**DIGITAL POWER LINE CARRIER (DPLC) Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Faisalabad West on Circuit-2.**											
5.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
5.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
5.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.		Meter	1000								
5.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PABX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum		No.	01								

	5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.											
5.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall		No.	01							

	also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
5.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system		Lot	01								
6	**OPTICAL FIBER TERMINAL EQUIPMENT (OLTE)** **Design, Manufacture, & Supply of new Optical Fiber Communication System (SDH+PDH) at 500kv G/S Ludewala and Integration with adjacent Grid Stations.**											
6.1	**SDH STM-4 upgradeable to STM-16 Multiplexer (Optical Line Terminal Equipment) along with PDH Multiplexer in 1+1 protected configuration,** complete with external trip counters, fully compatible and integrable with the existing NGC's		No.	01								

	SDH & PDH Network, equipped with at least **eight (08) STM-4 upgradeable to STM-16 optical TX/RX directions** and having a minimum configuration/capacity comprising protected **2 Nos.** cross-connect, **2 Nos.** controller and **2 Nos.** synchronization functions**; 2 Nos. protected 32-E1 electrical interface capacity; 2 Nos. protected power supply modules; 2 Nos. protected 8-port Ethernet interface capacity; EOW function complete with service telephone and accessories; IEC 60870-5-101 interface providing at least 16 RS-232 ports; IEC 60870-5-104 interface providing at least 2×8 Ethernet (10/100 Mbps) ports; auxiliary and alarm functions; 2 Nos. 4/2-wire E&M interfaces, each having at least 8 ports; FXS/FXO voice-frequency subscriber interfaces providing at least 12 ports; fan units; IDF and DDF,** complete with all necessary hardware, connectors, cables, software, licenses, accessories and Network Management System required for installation, integration, testing and commissioning**. The complete specified MCP shall be accommodated and simultaneously operational within the offered equipment/chassis arrangement. The contractor shall submit the proposed chassis/rack layout, slot allocation and module-wise configuration demonstrating accommodation of all specified functions and interfaces.**											
6.2	Self-supporting, floor-mounted swing-rack cubicle for SDH/PDH equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the		No.	01								

	incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant power supply to the Digital PAX equipment, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, telephone and signalling cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards.											
6.3	Self-supporting, floor-mounted swing-rack cubicle for installation of **Digital Protection Signalling Equipment and Trip Command Counter racks,** dimensions **800 × 600 × 2200 mm,** fabricated from suitable sheet steel, **RAL 7031 color**, with **IP54 protection index** and hinged front door fitted with **6 mm thick tempered glass**. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with **two 220V AC utility sockets,** AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a **Type 2 AC Surge Protection Device (SPD)** at the incoming AC supply with status indication/failure alarm contact, where applicable. The		No.	02								

	cubicle shall also be provided with **48VDC input/output terminal blocks and 48VDC MCBs (1+1)** for redundant power supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and **48VDC SPDs** at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, protection signaling, trip command and communication cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable **NGC Specifications and relevant IEC standards.**											
6.4	All other ancillary & interface equipment/hardware including Fiber optic patch cords for interconnection between ODF Racks, interconnection between SDH Equipment ports & ODF Racks, interconnection between SDH equipment and Digital protection equipment required to make the Optical Fiber Communication system fully functional.		Lot	01								
6.5	Optical Distribution Frame (ODF) Panel (self-standing cabinet 800x600x2200 mm, RAL7031 Color, IP54 Protection Index, fixed frame, front & rear hinged doors with hand lock & key, without roof fan) installed with Six (06) Nos. 48-fiber connector slide/pullout type ODF Racks (Fiber Optic Patch Panels) equipped with pigtails, splicing trays and associated accessories required for termination of 48 Fibers and fitted on fixed frame in the cubicle, vertical rings/guides in front-left & front right sides ODF panel guiding & neat management of FO patch cords, rings/guides on horizontal		No.	01								

	bars in front of each ODF Rack for horizontal management of Patch cords, horizontal metallic channels/meshing on the inner-left & inner-right walls of the ODF panel for binding/dressing/management of FO Cables & extra FO Patch cords, air filters, light, 220VAC supply socket with input & output terminals block, thermostat & hygrometer etc., including splicing/jointing/termination of all fibers of the new & existing OPGW/FO cable links in the respective ODF racks and end-to-end test of all optical fibers links											
6.6	Approach Fiber Optic Cables (48-fibers, armored) with required hardware, material & accessories: 1. Double Circuit Line towards 500 kv G/S Chashma-5 (C-5): Two (02) Armored Fiber Optic Approach Cables (FOACs) shall be provided, installed, terminated and tested from each OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Ludewala in the direction of 500kv G/S Chashma-5 (C-5), corresponding to the two OPGWs installed on both peaks of the Double Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site. 2. Single Circuit Line towards 500 kv G/S Chashma-5 (C-5): One (01) Armored Fiber Optic Approach Cable (FOAC) shall be provided, installed, terminated and tested from the OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Ludewala in the direction of 500 kv G/S Chashma-5 (C-5), corresponding to the OPGW installed on one peak of the Single Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site. Double Circuit Line towards 500kv G/S Faisalabad West: Two (02) Armored Fiber Optic Approach Cables (FOACs) shall be provided, installed, terminated and tested from each OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Ludewala in the direction of 500kv G/S Faisalabad West corresponding to the two OPGWs installed on both peaks of the Double Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site.		Meter	5000							

7	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Chasma-5 for Digital Teleprotection Link on Circuit-1.**											
7.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
8	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Chasma-5 for Digital Teleprotection Link on Circuit-2.**											
8.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
9	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Chasma-5 for Digital Teleprotection Link on Circuit-3.**											
9.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
10	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Faisalabad West for Digital Teleprotection Link on Circuit-1.**											

10.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
11	**DIGITAL PROTECTION SIGNALING EQUIPMENT** **Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Faisalabad West for Digital Teleprotection Link on Circuit-2.**											
11.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
12	**48V DC POWER SUPPLY SYSTEM (UPS) FOR TELECOM SYSTEM** **Design, Manufacture & Supply of complete 48V DC Power Supply System at 500KV G/S Ludewala.**											
12.1	Standalone Lead Acid Battery Bank, 48V DC, Plante Type, 24 Cells, 1200 Ah, complete with battery mounting racks of approved design, electrolyte fluid, interconnecting cables, lugs/connectors, inter-cell connectors, battery maintenance kit, 48V DC fuses with fuse box and accessories for battery protection, installation materials, DC cables as required, and all necessary hardware and accessories for complete installation, testing and commissioning of the 48V DC battery bank, in accordance with the applicable NGC/NGC Specifications.		No.	01								
12.2	Standalone automatic, fully solid-state battery chargers, 48V DC, 300 A continuous output rating each, with float, boost and manual equalizing charging facilities, independent control units, automatic charger changeover/load-sharing arrangement, complete with necessary protections, alarms, self-standing floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, complete with internal lighting, AC/DC cables,		No.	02								

	fuses/MCBs, installation materials, hardware and accessories for complete installation, testing and commissioning of 48VDC battery charger system in 1+1 redundant configuration, in accordance with applicable NGC/NGC Specifications.											
12.3	48V DC Distribution Panel, protection index IP54, housed in a self-standing floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, complete with internal lighting, equipped with at least 15 Nos. 2-pole 10 A DC Circuit Breakers, 15 Nos. 2-pole 20 A DC Circuit Breakers, 10 Nos. 2-pole 25 A DC Circuit Breakers, and 2-pole DC MCBs (1+1) for input 48VDC power supply from battery chargers/batteries. Complete with internal wiring/cabling, connector/terminal blocks for incoming and outgoing 48VDC power connections/distribution, labels, cable glands, and all necessary materials, hardware and accessories for complete installation		No.	01								
12.4	220V AC Distribution Panel, IP54, housed in a self-standing floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, complete with internal lighting, equipped with at least 15 Nos. 2-pole, 10 A, 220 V AC Circuit Breakers, 2-pole 220 V AC MCBs for incoming supplies, complete with automatic changeover arrangement for two incoming 220 V AC sources and AC Surge Protection Device (SPD) for protection against supply surges. Complete with internal wiring/cabling, proper connector/terminal blocks for incoming and outgoing 220 V AC connections to each Telecom Panel, labels, cable glands, and all necessary materials, hardware and accessories for complete installation, testing and commissioning, in accordance with applicable NGC/NGC Specifications		No.	01								
13	**COOLING SYSTEM**											
13.1	Air Conditioning Units: Supply, installation, testing and commissioning of two (02) Floor-Mounted, DC Inverter Type Air Conditioning Units, each of 4 Ton capacity, in 1+1 redundant configuration, at 500kv G/S Ludewala, complete with all necessary indoor and outdoor units, refrigerant piping, insulation, condensate drain arrangement, power and control cables, mounting/supporting arrangements, isolators, protection devices and all other auxiliary/ancillary equipment and accessories required for complete and reliable operation. The two Air		No.	02								

	Conditioning Units shall operate alternately on a duty/standby basis through an automatic programmable time-based control mechanism, so that each unit operates for a pre-set period and automatically transfers duty to the other unit. In the event of failure of the duty unit, the standby unit shall automatically start to ensure continuous air-conditioning. The Air Conditioning Units shall be of a well-renowned and internationally recognized manufacturer/brand, acceptable to NGC/Engineer, and suitable for continuous operation under prevailing site environmental conditions.											
14	**PROGRAMMING & TESTING EQUIPMENT**											
14.1	Latest-generation professional laptop with Intel Core Ultra 9/Core i9 or AMD Ryzen 9 9000 Series or higher/equivalent processor, or the latest-generation processor offering equivalent or superior performance available at the time design approval with minimum 32 GB DDR5 RAM, 1 TB NVMe SSD, 15.6-inch or larger Full HD/2K LED display, integrated graphics, Gigabit Ethernet (RJ-45), USB-A, USB-C and HDMI/DisplayPort interfaces, TPM 2.0, UEFI/Secure Boot, and Windows 11 Professional 64-bit (genuine, licensed and latest supported version), complete with original battery, charger, carrying bag, required USB/serial/Ethernet adaptors, cables and accessories. The Contractor shall supply the latest-generation professional laptop meeting or exceeding the above minimum technical requirements and available from the OEM at the time of technical approval and actual delivery. The offered laptop shall not be an obsolete, discontinued or end-of-life model. Any newer processor, hardware platform or technology introduced by the OEM by the time of approval/delivery shall be acceptable, provided that its performance, functionality and compatibility are equal to or better than the specified requirements and it is approved by NGC. The laptop shall also be supplied with genuine, licensed and latest compatible programming, configuration, diagnostic and O&M software, including required drivers, firmware/configuration tools and licenses for SDH/PDH, DPLC, Digital PABX, Gateway and Digital Protection Signalling Equipment, including associated management systems. All software shall be compatible with the latest supplied		No.	02								

	laptop hardware and operating system and shall be provided with valid licenses, installation media/download entitlement, and necessary updates/upgrades required for operation of the supplied equipment.											
14.2	Supply of portable, multifunction RTU I/O Tester for testing and verification of Digital Inputs (DI), Digital Outputs (DO), Analog Inputs (AI) and Analog Outputs (AO) of RTU systems during installation, commissioning, maintenance and troubleshooting. The tester shall be capable of simulating and measuring the required digital status/control signals and analog signals, including 4–20 mA, 0–20 mA and DC voltage signals, as applicable to the installed RTU I/O modules. The equipment shall be complete with all necessary test leads, probes, connectors, adapters, power supply/battery, charger, carrying case and accessories required for complete RTU I/O testing, commissioning and maintenance, complete in all respects. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.		No.	3								
14.3	Supply of portable, multifunction Loop Calibrator for testing, calibration and verification of RTU, transducers, SCADA analog input/output signals and associated signal loops, capable of measuring and sourcing/simulating 4–20 mA and 0–20 mA signals, with loop power supply and suitable accuracy. The calibrator shall include all necessary test leads, probes, connectors, batteries, charger, carrying case and accessories required for complete testing and calibration work. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.		No.	3								
14.4	Supply of portable, multifunction Signal Generator suitable for testing, commissioning, maintenance and troubleshooting of Digital Power Line Carrier (DPLC) equipment and associated communication channels. The Signal Generator shall be capable of generating stable test signals at selectable frequencies and adjustable output levels for testing of speech, data and carrier/baseband circuits, as applicable. The equipment shall be suitable for checking channel continuity, attenuation, signal level, frequency response and associated transmission paths. The Signal Generator shall be complete with all necessary test leads, cables,		No.	3								

	connectors, adapters, power supply/battery, charger, carrying case and accessories required for complete testing of DPLC equipment and communication links. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.											
14.5	Supply of portable, multifunction Teleprotection Tester suitable for testing, commissioning, maintenance and troubleshooting of Digital Protection Signalling Equipment (DPSE), integrated Teleprotection facilities of DPLC equipment and associated Teleprotection communication channels. The tester shall be capable of simulating and receiving Teleprotection commands, including trip, permissive, blocking and other binary commands, and shall provide facilities for verification of end-to-end operation, measurement of command transmission time/channel delay, testing of channel security and dependability, and verification of working and protection paths, where applicable. The tester shall be supplied complete with all necessary test leads, cables, connectors, adapters, probes, interface modules, communication cables, software/licenses, power supply, batteries/charger, carrying case and all other accessories required for complete testing, commissioning and troubleshooting of Teleprotection equipment and channels. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.		No.	3								
14.6	Supply of portable, high-accuracy Selective Level Meter (SLM) suitable for testing, commissioning, maintenance and troubleshooting of DPLC equipment and communication channels. The Selective Level Meter shall be capable of selective measurement of signal levels at specified frequencies and shall provide facilities for measurement of carrier signal level, attenuation, frequency response, noise and interfering signals, as applicable to the DPLC system. The equipment shall be suitable for testing DPLC terminals, LMUs, carrier frequency cables and complete end-to-end PLC communication links. The SLM shall be supplied complete with all necessary test leads, coaxial cables, universal connectors, adapters, probes, power supply/battery, charger, carrying case and all other accessories required for complete testing and		No.	3								

	maintenance of DPLC/PLC equipment and communication channels. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.											
	Sub Total Item G	-	-									
H.	**220kV Switch Yard Equipment**											
1	Circuit Breaker SF6 Gas type, three pole, 245kV 3150A, 50kA 1 sec, 220V DC motor mechanism with local control cubicle, bushings having extended creepage distance(31mm/kV), terminal connectors along with steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.		Set	04								
2.	Bus Isolators(without earthing switch), three pole, 245 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.		Set	10								
4.	245 kV, 50kA(1-sec), single pole, 3000:2400:1200:600/1A ratio, 5 core Current Transformers, cores having tapping (VA burdens 15,60,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance (31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.		No.	12								
5.	Capacitor voltage transformer (CVTs), 245 kV, Single pole, 2 core, 220/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.		No.	02								
6.	Surge Arrestors 198 kV, 50kA, with bushings having extended creepage distance, terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.		No.	06								
7.	245kV Post Insulator stacks, IEC type designation C10-1050 with bushings		No.	33								

	having extended creepage distance along with steel supporting structures, anchor bolts and all other allied equipment & accessories as specified as per IEC 60273 & IEC 60168.											
	Sub Total Item H	-	-									
I.	**245kV High Voltage Bus Work**											
1.	**String Assemblies**											
1.1	220 kV Double Tension String Assembly for 2×810mm^2 and 3×810mm^2 Al. Alloy conductor (Coreopsis) with Arcing Horn, Extension/Jumper Terminal, 160 kN (fog type) Disc insulators (18 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.(This also includes the String Assemblies to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).											
	With turnbuckle		Lot	1								
	Without turnbuckle		Lot	1								
1.2	220 kV Double Suspension String assembly for 2×810mm2 and 3×810mm^2 Al. Alloy conductor (Coreopsis) with Arcing Horn, 160 kN (fog type) Disc insulators (18 x 2 Nos.) etc. complete with hardware and allied accessories (This also includes the String Assemblies to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).		Lot	1								
3.	**Overhead Flexible Conductors**											
3.1	810 mm^2 Coreopsis Conductor as specified (This also includes the conductor to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).		Lot	1								
4.	**Aluminum Tubular Conductor**											
4.1	Aluminum tubular conductor for connection between switchyard equipment.		Lot	1								
5.	**Connectors, Hardware & Accessories**											
5.1	For 810 mm^2 Coreopsis Conductor as specified.		Lot	1								
5.2	For the connection of existing switchyard equipment with upgraded Bus Bar of 3×810mm2 Al. Alloy conductor (Coreopsis) as specified.		Lot	1								
5.3	For Aluminum tubular conductor for connection between switchyard equipment as specified.		Lot	1								

6.	**Steel Structure support 245kV Overhead Busses**											
6.1	**Beams**											
6.1.1	Length 16m (Triple Coreopsis Conductor)		No.	08								
6.1.2	Length 16m (Double Coreopsis Conductor)		No.	07								
6.2	**Column**											
6.2.1	18.5+4m (Double Coreopsis Conductor)		No.	10								
6.2.2	13m (Triple Coreopsis Conductor)		No.	16								
	Sub Total Item I	-	-									
J.	**220kV Control, Protection & Metering System**											
1.	**Relay Panels**											
1.1	220 kV Breaker Failure Protection Panel Type R5 of Breaker Failure Relays (with 03Nos. BF Relays) as specified in Clause No. 1.12.5 of NGC Specifications P204:2025.		No.	02								
1.2	Trip Circuit Supervision Relay Panel Type R6 with 18 Nos. TCS (18 Nos. of 220VDC) as specified in Clause No. 1.12.6 of NGC Specifications P204:2025.		No.	02								
2.	**Control Panels and Local Control Cubicles**											
2.1	220 kV Control Panel CA1b for 500/220 kV T/F(LV) + 220 kV T/Line with BCU and Mimic control for One & a Half Breaker Scheme (with 03 no. BCUs) as specified in Clause No. 5.17.2 of NGC Specifications P204:2025.		No.	02								
2.2	220 kV Local Control Cubicles S2 for 500/220 kV Transformer LV side Breakers (as per site work-scope requirements) as specified in Clause No. 3.22.15 of NGC Specification P204:2025.		No.	02								
2.3	Local Control Cubicles S3 for 220 kV Middle Breakers (as per site work-scope requirements) as specified in Clause No. 3.22.16 of NGC Specification P204:2025.		No.	02								
	Sub Total Item J	-	-									
K.	**AC & DC Auxiliary Supply System for 220kV Equipment**											
1.	415/230 V AC Auxiliary Sub-distribution Panel for 220 kV system (each for AC-I & AC-II) shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.		Nos.	02 Panels (01 No. for AC Busbar I &								

				01 No. of AC Busbar II)								
2.	220 V DC Auxiliary Sub-distribution Panel (each for DC-I & DC-II) for 220 kV system shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.		Nos.	02 Panels (01 No. for DC Busbar I & 01 No. of DC Busbar II)								
3.	Lead acid battery bank, 220V, 600AH(minimum) complete with accessories as specified to replace the existing 220V battery bank for 220kV Switchyard.		No.	2								
4.	Automatic static battery charger 220V, 100A (minimum) complete with accessories as specified to replace the existing battery chargers for existing 220kV switchyard.		No.	2								
	Sub Total Item K	-	-									
L	**11kV Equipment**											
1.	11.5/ 0.415 kV, 630kVA Pad Mounted Transformer (Alternate-III) along with all allied equipment and accessories as specified.		No.	2								
2.	11kV Metal clad Indoor type Switchgear Outgoing Panel VCB, 630A, 25kA Breaking Capacity as per NGC/ WAPDA Specification P-44:2018		No.	02								
3.	3-Core XLPE Power Cable 15,000 Volts, 4/0AWG including termination kits and accessories as specified.(for connection of 11.5/0.415kV Pad mounted transformer with Outgoing Panels)		Lot	1								
	Sub Total Item L	-	-	-	-							
M.	**Substation General Equipment**											
1.	**Substation Grounding System for 500kV, 220kV Switchyard and Buildings.**											
	Grounding System for entire Substation (for 50kA, 1 sec), indoor / outdoor equipment, control house building, control / relay room, generator room switchyard door / fence etc.											
1.1	Copper conductor 185mm^2(minimum).		Lot	1								
1.2	Earthing Rod 3 m(minimum) long as specified.		Lot	1								

1.3	Cartridges and Moulds with holding clamp.		Lot	1								
1.4	Grounding Connectors		Lot	1								
2.	**Overhead Shieldwire for 500kV & 220kV switchyard.**											
2.1	9 mm (7/3.0 mm) dia Galvanized Steel wire as specified.		Lot	1								
2.2	Assembly for 9 mm Earth wire fitting complete with all accessories as specified.		Lot	1								
3.	**Cables and Accessories.**											
3.1	Control and small power cables with all accessories		Lot	1								
3.2	Cable trays, racks, supports, cable conduits etc.		Lot	1								
4.	**Diesel Generator** 625 kVA, 415 V Standby Diesel Generator along with automatic changeover switch and all other equipment and accessories as specified.		No.	1								
5.	Out Door switchyard Lighting System as specified.		Lot	1								
6.	Mobile fire extinguisher for switchyard area.		No.	60								
7.	Fire extinguisher for control and relay buildings(wall mounted)		No.	20								
	Sub Total Item M	-	-	-	-							
N.	**Erection & Testing Equipment and Maintenance Tools**											
1	Phase sequence indicator as specified of Megger UK or approved Equivalent.		No.	1								
2	Primary current injection test sets specified of Megger UK or approved Equivalent.		No.	1								
3	Secondary injection relay test set as specified of Megger UK or approved Equivalent.		No.	1								
4	Digital phase angle meter as specified of Megger UK or approved Equivalent.		No.	1								
5	HV insulation resistance tester as specified of Megger UK or approved Equivalent.		No.	1								
6	Standard multi-range multi-meter as specified of Megger UK or approved Equivalent.		No.	4								
7	Clip on digital ammeter/voltmeter as specified of Megger UK or approved Equivalent.		No.	4								
8	Dielectric testing set for insulating oil as specified.		No.	1								
9.	Earth resistance testing set of Megger UK or approved Equivalent.		No.	1								
10.	SF6 Gas leak detector complete with accessories.		No.	1								

11.	Temporary earthing device for 500kV, 220 kV and 132 kV Switchyards.		No.	2								
12.	Selective level meter, including battery set and adapter.		No.	1								
13.	Level generator including battery set.		No.	1								
14.	Service Engineer's Tool Kit (Attach details of all equipment with unit prices)		No.	1								
15.	Circuit breaker analyzer Programme make, type TM-1600 as required or approved equivalent.		No.	1								
16.	Contact resistance measurement test set programme type micro ohmmeter MOM 200A or approved equivalent.		No.	1								
17.	Clip on current transformer small size with 1000/1A ratio as specified.		No.	2								
18.	C & DF test set as specified of Megger UK or Equivalent.		No.	1								
19.	Test equipment for verification of magnetization characteristics of CTs as specified of Megger UK or Equivalent.		No.	1								
20.	Portable phase shifter unit as specified.		No.	1								
21.	CT and VT polarity tester as specified.		No.	1								
22.	Test Leads complete with banana plugs											
	- long length leads		No.	60								
	- medium length leads		No.	60								
	- jumper leads		No.	30								
23.	Hi-Pot Test Set (A.C) as specified of Megger UK or Equivalent		Set	1								
24.	Hi-Pot Test Set (D.C) as specified of Megger UK or Equivalent		Set	1								
25.	Moveable Scaffolding: Height: 32 ft.		No.	1								
26.	Digital & microprocessor based energy meters (Alpha make) Test set		No.	1								
27.	Winding/Oil Thermometer Test Set		No.	1								
28.	Dew point test/SF6 Gas Purity Test Set.		Set	1								
29.	Clip on meter with provision of measuring power factor frequency and phase angle.		No.	1								
30.	Erection and maintenance equipment and tools for SF6 circuit breakers of each type used as specified		Set	1								
31.	Universal relay test set OMICRON 256 or approved equivalent		Set	1								
32.	Single phase variac as specified		Set	1								
33.	Three phase variac as specified		Set	1								
34.	Battery ground test set multiamp BGL or approved equivalent		No.	1								
35.	Battery test system TORREL 840 complete with extra load TXL870 software or equivalent		No.	1								
36.	Digital low resistance ohm meter for measuring transformer resistance		Set	1								

37.	Single Phase TTR test set Megger type 55005 or approved equivalent		Set	1								
38.	Microprocessor based universal relay testing set as specified of Megger UK or Equivalent.		Set	1								
39.	Sweep frequency response analyzer as specified		Set	1								
40.	Industrial Vacuum cleaner		No.	1								
	Sub Total of item N	-	-	-	-							
O.	**Mandatory Spare Parts**											
1.	**525/√3/231/√3/23 kV Auto Transformer Bank**											
1.1	500 kV bushing complete with gaskets and terminal connectors.		No	2								
1.2	245 kV bushing complete with gas kits and terminal connectors		No.	2								
1.3	Tertiary bushing complete with gas kits and terminal connectors.		No.	2								
1.4	Neutral bushing complete with gas kit and terminal connectors.		No	2								
1.5	DURESCA Busbar System complete for one Auto Transformer Bank		Set	1								
1.6	Bushing CT of each type used For											
	500 kV		Set	1								
	220 kV		Set	1								
	Tertiary		Set	1								
	Neutral		Set	1								
1.7	Cooling fans with motor		No.	6								
1.8	Motors of each type used		Set	1								
1.9	Pressure relief device replacement parts		Set	1								
1.10	Tap changer protection relay		No.	1								
1.11	Cover plate bolts, one of each type		Set	1								
1.12	Buchholz relay		No.	2								
1.13	Winding temperature indication system of each type.		Set	1								
1.14	Oil temperature indication system of each type		Set	1								
1.15	Oil level gauge of each type		Set	1								
1.16	Auxiliary relays and contactor, one of each type used		Set	1								
1.17	Tap changer motor drive		No.	1								
1.18	MCB's of each type used		Set	2								
1.19	Radiators for single phase auto-transformer.		Set.	1								
1.20	Remote tap position indicator.		No	1								
1.21	Silicagel		kg	60								
1.22	Set of Relays and Connectors for control cubicles		Set	1								
1.23	Set of Gaskits		Set	2								

1.24	Transformer Oil		liters	5,000								
1.25	Air Breather each type used		Set	2								
1.26	Surge Arrestor for Tertiary, Single pole		No.	2								
1.27	Post Insulator Used for Neutral Bus Bar with terminal connector		No.	2								
1.28	Spare parts for Nitrogen Injection fire explosion prevention System as recommended by manufacturer for operating life(25 years) of the equipment(bidder shall provide the detail along with price break down)		Set	2								
2.	**550/√3kV Shunt Reactor Bank**											
2.1	500 kV bushing complete with gaskets and terminal connectors.		No.	2								
2.2	Neutral bushing complete with gas kit and terminal connectors.		No.	2								
2.3	Gaskets with grease for cover, manholes and handholes comprising one of each type used.		Set	2								
2.4	Pressure relief device		No.	2								
2.5	Radiators for single phase reactor		Set.	2								
2.6	Buchholz relay		No.	2								
2.7	Winding temperature indication devices of each type.		Set	2								
2.8	Oil temperature indication devices of each type.		Set	2								
2.9	Oil gauges of each type		Set	2								
2.10	Bushing current transformer of each type used		Set	2								
2.11	Cover plates bolts one of each type		Set	2								
2.12	Auxiliary relays and contactors one of each type used		Set	2								
2.13	MCBs of each type used		Set	2								
2.14	Post Insulator Used for Neutral Bus Bar with terminal connector		No.	2								
2.15	Spare parts for Nitrogen Injection fire explosion prevention System as recommended by manufacturer for operating life(25 years) of the equipment(bidder shall provide the detail along with price break down)		Set	5								
3.	**550kV Circuit Breaker**											
3.1	Single Pole Circuit Breaker, SF6 Gas type, 550 kV, 3150 A, 50 kA 1 sec, complete with terminal connectors but without steel supporting structure.		No.	2								
3.2	Upper Part of single pole/ interrupting unit complete (i.e. porcelain and moving & fixed contact system)		No.	2								
3.3	Insulating Operating Rod		No.	2								

3.4	Fixed contact system complete		No.	2								
3.5	Moving contact system complete		No.	2								
3.6	Set of porcelain insulators of one pole (of interrupter and support insulator)		No.	2								
3.7	Operating mechanism complete		No.	2								
3.8	Auxiliary switch set		No.	2								
3.9	Safety pressure relief device for one pole		No.	6								
3.10	Closing Dashpot as applicable		No.	6								
3.11	Opening Dashpot as applicable		No.	6								
3.12	Closing coils		No.	4								
3.13	Trip coils		No.	4								
3.14	Set of gaskets for one pole		Set	6								
3.15	Molecular sieves/ Dryer Element for SF6 for one pole		No.	3								
3.16	SF6 gas in standard containers (sufficient for 6 breaker sets)		Lot	1								
3.17	Motors & pump of each type used.		Set	2								
3.18	Set of spares for operating mechanism (attach list)		Set	2								
3.19	Set of auxiliary relays used in control and auxiliary circuits		Set	4								
3.20	Set control switches and push buttons used in control and auxiliary circuits.		Set	4								
4.	**<u>550kV Disconnectors</u>**											
4.1	3-phase set of male and female contacts for Disconnectors.		Set	3								
4.2	3-phase set of male and female contacts for Earthing Switch.		Set	1								
4.3	Motor operated mechanism complete disconnector		Set	3								
4.4	Pedestal insulators for disconnector.		Set	3								
4.5	Auxiliary switches for disconnector		Set	3								
4.6	Auxiliary switches for Earthing Switch		Set	1								
4.7	Motor of each type used		Set	3								
4.8	Heater		No.	3								
4.9	Limit switches		Set	3								

4.10	Thermal Relay (thermo + humidity)		No.	3								
4.11	Contactor and fuses of each type used		Set	3								
4.12	Resistor, diodes and switches		Set	3								
4.13	Motor clutch		No.	3								
4.14	Motor brake		No.	3								
5.	**<u>550kV Current Transformer</u>**											
5.1	Current Transformers, single pole, 550 kV, 50 kA 1 sec, 5 core of current ratio **3000: 2500:2000:1250:750/ 1A** complete with terminal connectors but without steel supporting structure.		No.	3								
5.2	Gasket of each type used.		Set.	3								
6.	**<u>550kV Capacitor Voltage Transformer</u>**											
6.1	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.		No.	1								
6.2	MCB's one of each type used.		Set.	1								
6.3	Gasket of each type used.		Set	1								
7.	**<u>550kV Coupling Capacitor Voltage Transformer</u>**											
7.1	Coupling Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.		No.	1								
7.2	MCB's one of each type used.		Set.	1								
7.3	Drain Coil		No.	1								
7.4	Gasket of each type used.		Set	1								
8.	**<u>444kV Surge Arrestors</u>**											
8.1	Surge Arrestors 444 kV, 50kA, Single Pole complete with terminal connectors but without steel supporting structure.		No.	2								
9.	**<u>550kV Insulators</u>**											
9.1	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance		No.	4								

	without steel supporting structure.											
9.2	Disc insulators (fog type) 160 kN.		No.	400								
10.	**245kV Circuit Breaker**											
10.1	Single Pole Circuit Breaker, SF6 Gas type, 245 kV, 3150 A, 50 kA 1 sec, complete with terminal connectors but without steel supporting structure.		No.	1								
10.2	Upper Part of single pole/ interrupting unit complete (i.e. porcelain and moving & fixed contact system)		No.	1								
10.3	Insulating Operating Rod		No.	1								
10.4	Fixed contact system complete		No.	1								
10.5	Moving contact system complete		No.	1								
10.6	Set of porcelain insulators of one pole (of interrupter and support insulator)		No.	1								
10.7	Operating mechanism complete		No.	1								
10.8	Auxiliary switch set		No.	1								
10.9	Safety pressure relief device for one pole		No.	3								
10.10	Closing Dashpot as applicable		No.	3								
10.11	Opening Dashpot as applicable		No.	3								
10.12	Closing coils		No.	2								
10.13	Trip coils		No.	2								
10.14	Set of gaskets for one pole		Set	3								
10.15	Molecular sieves/ Dryer Element for SF6 for one pole		No.	3								
10.16	SF6 gas in standard containers (sufficient for 6 breaker sets)		Lot	1								
10.17	Motors & pump of each type used.		Set	1								
10.18	Set of spares for operating mechanism (attach list)		Set	1								
10.19	Set of auxiliary relays used in control and auxiliary circuits		Set	2								
10.20	Set control switches and push buttons used in control and auxiliary circuits.		Set	2								
11	**245kV Bus Disconnector**											
11.1	3-phase set of male and female contacts for Disconnectors.		Set	1								

11.2	Motor operated mechanism complete disconnector		Set	1								
11.3	Pedestal insulators for disconnector.		Set	1								
11.4	Auxiliary switches for disconnector		Set	1								
11.5	Motor of each type used		Set	1								
11.6	Heater		No.	1								
11.7	Limit switches		Set	1								
11.8	Thermal Relay (thermo + humidity)		No.	1								
11.9	Contactor and fuses of each type used		Set	1								
11.10	Resistor, diodes and switches		Set	1								
11.11	Motor clutch		No.	1								
11.12	Motor brake		No.	1								
12	**245kV Current Transformer**											
12.1	Current Transformers, single pole, 245 kV, 50 kA 1 sec, 5 core of current ratio 3000: 2400:1200:600/ 1A complete with terminal connectors but without steel supporting structure.		No.	1								
12.2	Gasket of each type used.		Set.	1								
13.	**245kV Capacitor Voltage Transformer**											
13.1	Capacitor voltage transformer (CVTs), 245 kV, Single pole, 2 core, **220/√3kV / 110/√3V / 110/√3V voltage ratio,** complete with terminal connectors but without steel supporting structure.		No.	1								
13.2	MCB's one of each type used.		Set.	1								
13.3	Gasket of each type used.		Set	1								
14.	**198kV Surge Arrestors**											
14.1	Surge Arrestors 198 kV, 50kA, Single Pole complete with terminal connectors but without steel supporting structure.		No.	01								
15	**Control, Protection & Metering System**											
15.1	500 kV Line Distance Relay Set-I relay of each type used.		No.	01								
15.2	500 kV Line Distance Relay Set-II relay of each type used.		No.	01								

15.3	500/220 kV Auto Transformer Differential Relay Set-I of each type used.		No.	01								
15.4	500/220 kV Auto Transformer Differential Relay Set-II of each type used.		No.	01								
15.5	500/220 kV Auto Transformer REF Relay will all allied accessories of each type used.		No.	01								
15.6	500/220 kV Auto Transformer Tertiary Overcurrent & Earth Fault Relay		No.	02								
15.7	500 kV Centralized Type Low Impedance Bus Bar Differential Protection Relay.		No.	01								
15.8	500 kV Breaker Failure Relay.		No.	02								
15.9	220 kV Breaker Failure Relay.		No.	02								
15.10	Synch-Check Relay for 500kV		No.	02								
15.11	Synch-Check Relay for 220kV		No.	02								
15.12	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set I of each type used		Lot	01 (10% of installed quantity)								
15.13	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set II of each type used		Lot	01 (10% of installed quantity)								
15.14	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Differential Protection Relay Set I of each type used		Lot	01 (10% of installed quantity)								
15.15	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Differential Protection Relay Set II of each type used		Lot	01 (10% of installed quantity)								
15.16	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Breaker Failure of each type used		Lot	01 (10% of installed quantity)								
15.17	Power Supply Card & Analog I/O Card used for Bay Control Units of each type used		Lot	01 (10% of								

				instal led quan tity)								
15.18	Trip Circuit Supervision Relay (220 VDC) of each type used.		No.	10								
15.19	High Speed, High Burden Self Reset Trip Relay (220 VDC) of each type used (08 NO + 2 NC).		No.	04								
15.20	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (18 NO + 2 NC).		No.	04								
15.21	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (08 NO + 2 NC).		No.	08								
15.22	Test Blocks for Relay of each type used.		No.	10% of instal led quan tity								
15.23	Test Plugs for Relays, BCUs, Metering equipment etc. compatible with test blocks of each type used.		No.	04								
15.24	All other auxiliary relays, miscellaneous relays, control switches and accessories of each type used in Protection Panels, Control Panels & Local Control Cubicles. (Minimum 10% of installed quantity).		Lot	01								
15.25	DC Supervision Relay (220 V DC) of each type used.		No.	06								
15.26	Bay Control Unit for 500 kV Bus-I side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.		No.	01								
15.27	Bay Control Unit for 500 kV Mid CB having max. nos. of I/O of type used.		No.	01								
15.28	Bay Control Unit for 500 kV Bus-II side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.		No.	01								
15.29	Bay Control Unit for 220 kV Bus-II side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.		No.	01								
15.30	Bay Control Unit for 500 kV Mid CB.) having max. nos. of I/O of type used.		No.	01								
15.31	Common Bay Control Unit of each type used for 500 kV system		No.	01								
15.32	Fiber Optic / Patch Cables Single core with connectors of each type of Maximum length used		Nos.	15								
15.33	Multi-core Fiber Optic Cable of Maximum cores and length type used		Nos.	03								
15.34	Bay Level Ethernet Switches of Each type used.		Nos.	02								
15.35	Station Level Ethernet Switches of Each type used		Nos.	01								
15.36	Fiber Optic Connectors used for cable terminations.		Nos.	20								
15.37	Optical Distribution Frames / Optical Fiber Splicing Cassette.		Nos.	04								

15.38	Fault Recorder IEDs each type used		Nos.	01								
15.39	Fault Recorder IEDs plug in modules each type used			Min. 10% of total quantity								
15.40	GPS Master Clock along with complete accessories		Set	01								
15.41	Auxiliary & control relays, Control & selector switches, indicating lamps, etc. used in BCU Panels & Control Panels. (Minimum 10% of installed quantity).		Lot	01								
15.42	AC & DC Auxiliary Services Panels relays, CBCT sensors, control equipment & allied accessories each type used for 500 kV and 220 kV System		No.	10% of total quantity used								
15.43	Operator Workstation of each type used.		Set	01								
16.	**Spare Connectors** 550kV & 245kV Spare connectors of each type, equal to 10% of quantity used (minimum one).		Lot	1								
17	**Telecom Equipment**											
17.1	**DPLC, Outdoor and PABX Equipment**											
17.1.1	DPLC Spare Modules/Cards sufficient for O&M of speech, data, tele-protection, power supply and CPU functions, with a minimum quantity of 2 Nos. of each module type or 10% of the approved design, whichever is higher. Spares shall be identical and fully compatible with the approved DPLC system and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item		Lot	01								
17.1.2	Spare Parts for Digital PAX System sufficient for O&M, with a minimum quantity of 2 Nos. of each module type or 10% of the approved design, whichever is higher. Spares shall be identical and fully compatible with the approved Digital PAX system and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item		Lot	01								
17.1.3	Wideband tuning pot one of each type (for 500 kv) along with surge arrestor.		No.	04								

17.1.4	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
17.1.5	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 63kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
18.2	**OLTE (SDH+PDH)**											
18.2.1	Spare Parts for OLTE Equipment, sufficient for O&M, with a minimum quantity of 2 Nos. of each module type or 10% of the approved quantity of each module type, whichever is higher. Spares shall be identical and fully compatible with the approved equipment and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item.		Lot	01								
18.3	**Digital Protection Signalling Equipment**											
18.3.1	Spare Parts for Digital Protection Signalling Equipment, sufficient for O&M, with a minimum quantity of 2 Nos. of each module type or 10% of the approved quantity of each module type, whichever is higher. Spares shall be identical and fully compatible with the approved equipment and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item.		Lot	01								
18.3.2	Fiber Optic patch cords, 10 Nos. SFPs of STM-4		No.	10								
18.3.3	Fiber Optic patch cords, 10 Nos. SFPs of STM-16		No.	5								
18.3.3	Fiber Optic patch cords		No.	10								
19	**SCADA EQUIPMENT**											
19.1	Transducers for Current Measurement, of European make or		No.	20								

	equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.											
19.2	Transducers for Voltage Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.		No.	20								
19.3	Transducers for Active Power Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.		No.	10								
19.4	Transducers for Reactive Power Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.		No.	10								
19.5	Transducers for Power Factor Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.		No.	10								
19.6	Transducers for Frequency Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.		No.	10								
19.7	Multifunction Transducers, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.		No.	10								
19.8	Cables and software for programming of transducers		No.	6								
	Sub Total of Item N	-	-	-	-							
	Sub Total of Item I (Item A to O)	**-**	-	**-**	**-**							

II	**Extension Works at 500/220/132kV Faisalabad West Grid Station**											
A	**500kV Switch Yard Equipment**											
1.	Circuit Breaker SF6 Gas type, three pole, 550kV 3150A, 63kA 1 sec, with pre-insertion resistors, grading capacitor, busing having extended creepage distance(31mm/kV), 220V DC operating mechanism with local control cubicle, terminal connectors, steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.		Set	3								
2.	Bus Disconnector (without earthing switch), three pole, 550 kV, 3150 A, 63 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.		Set	6								
3.	Line Disconnectors (with earthing switch), three pole, 550 kV, 3150 A, 63 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.		Set	2								
4.	550 kV, 63kA(1-sec), single pole, 3000-2500:2000:1250/1A ratio, 6 core Current Transformers, cores having tapping (VA burdens 15,30,30,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance(31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.		No.	9								
5.	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box (1 for each set of 3 No. CVTs), steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.		No.	2								

6.	Coupling Capacitor voltage transformer (CCVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, with carrier coupling accessories, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.		No.	4								
7.	Surge Arrestors 444 kV, 63kA, Single Pole with bushings having extended creepage distance(31mm/kV), terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.		No.	6								
8.	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied accessories as per IEC 60273 & IEC 60168 and all other allied equipment & accessories as specified.		**No.**	**28**								
	Sub Total Item A	-	-	-	-							
B.	**500kV High Voltage Bus Work**											
1.	**<u>String Assemblies</u>**											
1.1	500 kV Double Tension String Assembly for 3×810mm^2 and 4×810mm^{2}Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, Extension/Jumper terminal, 160kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.											
	with turn buckle		Lot	1								
	without turn buckle		Lot	1								
1.2	500 kV Double Suspension String Assembly (V Type) for 3×810mm^2 and 4×810mm^2 Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, 160 kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.		Lot	1								
2.	**<u>Overhead Flexible Conductors</u>**											
2.1	810 mm^2 Coreopsis Conductor as specified.		Lot	1								
3.	**<u>Aluminum Tubular Conductor</u>**											

3.1	Aluminum tubular conductor for connection between switchyard equipment as specified.		Lot	1								
4.	**Connectors, Hardware & Accessories**											
4.1	For 810 mm^2 Coreopsis Conductor as specified.		Lot	1								
4.2	For Aluminum tubular conductor of connection between switchyard equipment as specified.		Lot	1								
5.	**Steel Structure support 500kV Overhead Busses**											
5.1	**Beams**											
5.1.1	32m (Triple Coreopsis Conductor) V1		Nos.	2								
5.1.2	32m (Triple Coreopsis Conductor) V2		Nos.	**3**								
5.1.3	32m (Triple Coreopsis Conductor) V2X		Nos.	1								
5.1.4	33m (Quad Coreopsis Conductor) V3G		Nos.	2								
5.2	**Column**											
5.2.1	(30.75+9.25)m Type C1(Triple Coreopsis Conductor)		Nos.	2								
5.2.2	(20+10.75+9.25)m Type C3 (Quad Coreopsis Conductor)		Nos.	1								
5.2.3	(20+10.75+9.25)m Type C3X (Quad Coreopsis Conductor)		Nos.	1								
5.2.4	20m Type C4 (Quad Coreopsis Conductor)		Nos.	2								
5.2.5	(20+10.75+9.25)m Type C5 (Triple Coreopsis Conductor)		Nos.	2								
	Sub Total Item B	-	-									
C.	**500kV Control, Protection & Metering System**											
1.	**Relay Panels**											
1.1	500 kV Line Distance Protection Relay Panel R11– Set-I as specified **in Clause No. 1.11.1 of NGC Specifications P204:2025.**		Nos.	02								
1.2	500 kV Line Distance Protection Relay Panel R12– Set-II as specified **in Clause No. 1.11.2 of NGC Specifications P204:2025.**		Nos.	02								
1.3	500 kV Breaker Failure Protection Panels R15 as specified **in Clause No. 1.11.5 of NGC Specifications P204:2025.**		Nos.	01								
1.4	Trip Circuit Supervision Relay Panel Type R16 with 18 Nos. TCS of 220VDC as specified **in Clause No. 1.11.6 of NGC Specifications P204:2025.**		Nos.	01								
2.	**Control Panels and Local Control Cubicles**											

2.1	Common BCU & Synch Panel for 500 kV system type CC2 **as specified in Clause No. 5.19.6 of NGC Specification P204:2025.**		Nos.	01								
2.2	500 kV Control Panel WCA2 for Line + Line Dia with BCUs and Mimic Control for One & a Half Breaker Scheme **as specified in Clause No. 5.16.3 of NGC Specifications P204:2025.**		Nos.	01								
2.3	Local Control Cubicles for 500 kV T/Line side Breakers S1 (as per site work-scope requirements) **as specified in Clause No. 3.21.10 of NGC Specification P204:2025.**		Nos.	02								
2.4	Local Control Cubicles for 500 kV Middle Breakers S3 (as per site work-scope requirements) for line-line Dia as specified **in Clause No. 3.21.12 of NGC Specification P204:2025.**		Nos.	01								
2.5	**SAS / SCADA Equipment at Faisalabad West**											
2.5.1	Modification and expansion of the existing Gateway system installed at 500kV G/S Faisalabad West for incorporation of additional SCADA signals associated with the two new bays towards 500kv Ludewala, in accordance with the approved I/O Signal List and NGC Gateway specifications. The scope shall include Gateway database expansion, signal/point configuration, required hardware/ interface modules, communication ports, software and licenses, wherever required, to accommodate and process the additional signals from the two new bays. All necessary accessories, including cables, connectors, terminals, wiring, patching and other hardware/software required for complete modification and expansion of the existing Gateway shall be included. The Contractor shall ensure that the existing Gateway remains fully operational and that the expansion has adequate capacity for the additional signals without affecting existing services		Lot	01								
3	**SAS / Miscellaneous Panels**											
3.1	All material required for Substation Automation System (SAS) integration of the subject extension scope of work with the existing Substation Automation System (SAS).		Lot	01								
3.2	All necessary material/devices/relays (i.e., tripping Relays, Auxiliary Relays, Contactor Relays, AC/DC MCBs, Terminal Blocks etc.,) required for proper operation/integration and completion of applicable scope of works		Lot	01								

	(i.e., Busbar Protection Scheme, Breaker Failure Protection Scheme, Substation Automation System, Common Alarms Scheme, AC/DC Auxiliary Supply System etc., schemes) as per actual site requirements.											
4.	**Metering Panel**											
4.1	Metering panel 4-Line (without AC Power Transducers and paperless recorder) with two (2) Energy meters (accuracy class 0.2S) for 500kV Line metering as per NGC specifications P-199:2008 and P202:2012 amended to date.		No.	1								
	Sub Total Item C	-	-									
D.	**AC & DC Auxiliary Supply System for 500kV Equipment**											
1.	415/230 V AC Auxiliary Sub-distribution Panel for 500 kV system (each for AC-I & AC-II) shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.		No.	02 Panels (01 No. for AC Busbar I and 01 No. of AC Busbar II)								
2.	220 V DC Auxiliary Sub-distribution Panel (each for DC-I & DC-II) for 500 kV system shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.		No.	02 Panels (01 No. for DC Busbar I and 01 No. of DC Busbar II)								
	Sub Total Item D	-	-									
E.	**Substation General Equipment**											
1.	**Substation Grounding System for 500kV Switchyard and Building.**											
	Grounding System for Extended Portion of Substation(for 63kA, 1 sec), indoor / outdoor equipment, control house building, control / relay room, switchyard door / fence etc.											

1.1	Copper conductor 185mm² (minimum).		Lot	1								
1.2	Earthing Rod 3 m long as specified.		Lot	1								
1.3	Cartridges and Moulds with holding clamp.		Lot	1								
1.4	Grounding Connectors		Lot	1								
2.	**Overhead Shieldwire for Extended portion of 500kV Switchyard.**											
2.1	9 mm (7/3.0 mm) dia Galvanized Steel wire as specified.		Lot	1								
2.2	Assembly for 9 mm Earth wire fitting complete with all accessories as specified.		Lot	1								
3.	**Cables and Accessories.**											
3.1	Control and small power cables with all accessories		Lot	1								
3.2	Cable trays, racks, supports, cable conduits etc.		Lot	1								
4.	Out Door switchyard Lighting System for extended portion of 500kV switchyard as specified.		Lot	1								
5.	Mobile fire extinguisher for switchyard area.		No.	8								
	Sub Total Item E	-	-									
F.	**TELECOM EQUIPMENT**											
1	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture & Supply of complete DPLC Communication & PSE System at 500kv G/S Faisalabad West direction 500kv Ludewala on Circuit-1.**											
1.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 63kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
1.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
1.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the		Meter	1000								

	LMUs and between the DPLC sets, if required according to requirement at site.											
1.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.		No.	01								
1.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The		No.	01								

	cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
1.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required		Lot	01								

	to install the complete functional system											
2	**DIGITAL POWER LINE CARRIER (DPLC) Design, Manufacture & Supply of complete DPLC Communication & PSE System at 500kv G/S Faisalabad West direction 500kv Ludewala on Circuit-2.**											
2.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 63kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.		No.	02								
2.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.		No.	02								
2.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.		Meter	1000								
2.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PABX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE,		No.	01								

	at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.											
2.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The		No.	01							

	cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards											
2.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system		Lot	01								
3	**DIGITAL PRIVATE AUTOMATIC EXCHANGE (PAX) Design, Manufacture & Supply of complete Digital PAX/Telephone system at 500kv G/S Ludewala and interfacing/integration with PAX already installed at remote ends.**											
3.1	Digital Private Automatic Exchange (PAX) of capacity 36x36, 4-VoIP & 6xE1 interface, 02-Digital Subscriber Modules with 3rd party VoIP telephone sets and licenses for 08-SIP users, software & management system and modem completely compatible & integrate-able with NGC's existing Telephone Network including the associated cables, test leads/ cables/adaptors/tools, hardware and accessories etc. required to integrate the new PAX with the existing NGC's Telephone/PAX Network via new & existing DPLC & SDH/PDH channels complete in all respects (hardware-wise/software-wise & management-wise) for a fully functional Telephone/PAX system.		No.	01								
3.2	Self-supporting, floor-mounted swing-rack cubicle for installation of Digital PAX equipment, dimensions		No.	01								

	800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220 V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant power supply to the Digital PAX equipment, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, telephone and signalling cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards.											
3.3	Main Distribution Frame (MDF), 1200-pair capacity, complete with self-supporting floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, IP54 protection, hinged front door with 6 mm tempered glass, air louvers with filters, internal light,		No.	01								

	220 V AC utility socket with input/output terminal blocks, thermostat and hygrometer. The MDF shall be equipped with Krone-type LSA disconnect modules or equivalent, protection fuse/Surge Arrestor magazines as required, terminal/module identification strips, cable guide rings and supports for proper cable routing and dressing, insertion tools, 2-pole disconnecting plugs, dummy plugs, test cords and patch cords, complete with suitable earthing arrangement, all necessary hardware and accessories for complete installation, testing and commissioning in accordance with applicable NGC Specifications.											
3.4	Normal analogue telephone sets, complete with all standard calling, dialing, ring, hold and other required features, fully compatible and interoperable with the existing NGC telephone/PAX system, including all necessary cords, connectors, accessories and associated hardware required for complete and satisfactory operation		No.	12								
3.5	SIP Telephone Set. The SIP telephone shall support standard SIP protocol and shall be supplied complete with all required user licenses, power adapter/PoE compatibility, Ethernet patch cord, configuration, accessories and associated hardware/software required for complete and satisfactory operation		No.	06								
3.6	All other ancillary materials such as telephone cables, connectors, jumpers, harnesses, mountings frames, fuses, relays, nuts bolts etc. for a complete & functional system		Lot	01								
3.7	Pertinent equipment/material/hardware/boards/ software for the interfacing and integration (complete in all respects) of new PAX with existing PAX equipment already installed in NGC's Telecom Network.		Lot	01								
4.	**OPTICAL FIBER TERMINAL EQUIPMENT (OLTE) at 500kv G/S Faisalabad West and Integration with adjacent Grid Stations. (Contractor shall use the Existing OLTE)**											
4.1	Pertinent equipment, materials, hardware, interface cards/boards, software, licenses, accessories and all other ancillary items required for complete interfacing and seamless integration of the existing SDH/PDH equipment with the new SDH/PDH		Lot	01								

	equipment to be installed at 500kv Ludewala Grid Station, complete in all respects.											
4.2	Double Circuit Line towards 500kv G/S Ludewala: Two (02) Armored Fiber Optic Approach Cables (FOACs) shall be provided, installed, terminated and tested from each OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Faisalabad in the direction of 500kv G/S Ludewala, corresponding to the two OPGWs installed on both peaks of the Double Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site.		Meter	2000								
4.3	Self-supporting, floor-mounted swing-rack cubicle for installation of **Digital Protection Signalling Equipment and Trip Command Counter racks,** dimensions **800 × 600 × 2200 mm,** fabricated from suitable sheet steel, **RAL 7031 color**, with **IP54 protection index** and hinged front door fitted with **6 mm thick tempered glass**. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with **two 220V AC utility sockets,** AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a **Type 2 AC Surge Protection Device (SPD)** at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with **48VDC input/output terminal blocks and 48V DC MCBs (1+1)** for redundant power supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and **48V DC SPDs** at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, protection signaling, trip command and communication cables, suitable		No.	01								

	terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable **NGC Specifications and relevant IEC standards.**											
4.4	Optical Distribution Frame (ODF) Panel (self-standing cabinet 800x600x2200 mm, RAL7031 Color, IP54 Protection Index, fixed frame, front & rear hinged doors with hand lock & key, without roof fan) installed with four (04) Nos. 48-fiber connector slide/pullout type ODF Racks (Fiber Optic Patch Panels) equipped with pigtails, splicing trays and associated accessories required for termination of 48 Fibers and fitted on fixed frame in the cubicle, vertical rings/guides in front-left & front right sides ODF panel guiding & neat management of FO patch cords, rings/guides on horizontal bars in front of each ODF Rack for horizontal management of Patch cords, horizontal metallic channels/meshing on the inner-left & inner-right walls of the ODF panel for binding/dressing/management of FO Cables & extra FO Patch cords, air filters, light, 220VAC supply socket with input & output terminals block, thermostat & hygrometer etc., including splicing/jointing/termination of all fibers of the new & existing OPGW/FO cable links in the respective ODF racks and end-to-end test of all optical fibers links		No.	01							
4.5	All other ancillary & interface equipment/hardware including Fiber optic patch cords for interconnection between ODF Racks, interconnection between SDH Equipment ports & ODF Racks, interconnection between SDH equipment and Digital protection equipment required to make the Optical Fiber Communication system fully functional.		Lot	01								
5	**DIGITAL PROTECTION SIGNALING EQUIPMENT** **Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500kv G/S Faisalabad**											

	West direction 500kv G/S Ludewala for Digital Teleprotection Link on Circuit-1.											
5.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
6	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500kv G/S Faisalabad West direction 500kv G/S Ludewala for Digital Teleprotection Link on Circuit-2.**											
6.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.		No.	01								
7	**48V DC POWER SUPPLY SYSTEM (UPS) FOR TELECOM SYSTEM AT 500KV G/S FAISALABAD WEST**											
7.1	All other ancillary & interface equipment/hardware including AC/DC Cables for 48V DC power supply connections from existing DC system to Telecom equipment to be installed under this contract in direction of 500kv G/S Ludewala to make the Optical Fiber Communication and DPLC system fully functional.		Lot	01								
G.	**Mandatory Spare Parts**											
1.	**<u>550kV Circuit Breaker</u>**											
1.1	Single Pole Circuit Breaker, SF6 Gas type, 550 kV, 3150 A, 63 kA 1 sec, complete with terminal connectors but without steel supporting structure.		No.	1								
1.2	Upper Part of single pole/ interrupting unit complete (i.e. porcelain and moving & fixed contact system)		No.	1								
1.3	Insulating Operating Rod		No.	1								

1.4	Fixed contact system complete		No.	1								
1.5	Moving contact system complete		No.	1								
1.6	Set of porcelain insulators of one pole (of interrupter and support insulator)		No.	1								
1.7	Operating mechanism complete		No.	1								
1.8	Auxiliary switch set		No.	1								
1.9	Safety pressure relief device for one pole		No.	3								
1.10	Closing Dashpot as applicable		No.	3								
1.11	Opening Dashpot as applicable		No.	3								
1.12	Closing coils		No.	2								
1.13	Trip coils		No.	2								
1.14	Set of gaskets for one pole		Set	3								
1.15	Molecular sieves/ Dryer Element for SF6 for one pole		No.	1								
1.16	SF6 gas in standard containers (sufficient for 6 breaker sets)		Lot	1								
1.17	Motors & pump of each type used.		Set	1								
1.18	Set of spares for operating mechanism (attach list)		Set	1								
1.19	Set of auxiliary relays used in control and auxiliary circuits		Set	2								
1.20	Set control switches and push buttons used in control and auxiliary circuits.		Set	2								
2.	**<u>550kV Disconnectors</u>**											
2.3	3-phase set of male and female contacts for Disconnectors.		Set	1								
2.4	3-phase set of male and female contacts for Earthing Switch.		Set	1								
2.5	Motor operated mechanism complete disconnector		Set	1								
2.6	Pedestal insulators for disconnector.		Set	1								
2.7	Auxiliary switches for disconnector		Set	1								
2.8	Auxiliary switches for Earthing Switch		Set	1								
2.9	Motor of each type used		Set	1								
2.10	Heater		No.	1								
2.11	Limit switches		Set	1								

2.12	Thermal Relay (thermo + humidity)		No.	1								
2.13	Contactor and fuses of each type used		Set	1								
2.14	Resistor, diodes and switches		Set	1								
2.15	Motor clutch		No.	1								
2.16	Motor brake		No.	1								
3.	**550kV Current Transformer**											
3.1	Current Transformers, single pole, 550 kV, 63 kA 1 sec, 6 core of current ratio 3000:2500:2000:1250/ 1A complete with terminal connectors but without steel supporting structure.		No.	1								
3.2	Gasket of each type used.		Set.	1								
4.	**550kV Capacitor Voltage Transformer**											
4.1	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.		No.	1								
4.2	MCB's one of each type used.		Set.	1								
4.3	Gasket of each type used.		Set	1								
5.	**550kV Coupling Capacitor Voltage Transformer**											
5.1	Coupling Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.		No.	1								
5.2	MCB's one of each type used.		Set.	1								
5.3	Drain Coil		No.	1								
5.4	Gasket of each type used.		Set	1								
6.	**444kV Surge Arrestors**											
6.1	Surge Arrestors 444 kV, 63kA, Single Pole complete with terminal connectors but without steel supporting structure.		No.	1								
7.	**Control, Protection & Metering System**											
7.1	500 kV Line Distance Relay Set-I relay of each type used.		No.	1								
7.2	500 kV Line Distance Relay Set-II relay of each type used.		No.	1								

7.3	500 kV Breaker Failure Relay.		No.	1								
7.4	Synch-Check Relay for 500kV		No.	1								
7.5	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set I of each type used		Lot	01 (10% of installed quantity)								
7.6	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set II of each type used		Lot	01 (10% of installed quantity)								
7.7	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Breaker Failure of each type used		Lot	01 (10% of installed quantity)								
7.8	Power Supply Card & Analog I/O Card used for Bay Control Units of each type used		Lot	01 (10% of installed quantity)								
7.9	Trip Circuit Supervision Relay (220 VDC) of each type used.		Nos.	04								
7.10	High Speed, High Burden Self Reset Trip Relay (220 VDC) of each type used (08 NO + 2 NC).		Nos.	02								
7.11	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (18 NO + 2 NC).		Nos.	02								
7.12	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (08 NO + 2 NC).		Nos.	04								
7.13	Test Blocks for Relay of each type used.		Nos.	10% of installed quantity								
7.14	Test Plugs for Relays, BCUs, Metering equipment etc. compatible with test blocks of each type used.		Nos.	04								
7.15	All other auxiliary relays, miscellaneous relays, control switches and accessories of each type used in Protection Panels, Control Panels & Local Control Cubicles. (Minimum 10% of installed quantity).		Lot	01								
7.16	DC Supervision Relay (220 V DC) of each type used.		Nos.	06								

7.17	Bay Control Unit for 500 kV Bus-I side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.		Nos.	01								
7.18	Bay Control Unit for 500 kV Mid CB having max. nos. of I/O of type used.		Nos.	01								
7.19	Fiber Optic / Patch Cables Single core with connectors of each type; maximum length used		Nos.	15								
7.20	Multi-core Fiber Optic Cable of Maximum cores and length type used		Nos.	03								
7.21	Fiber Optic Connectors used for cable terminations.		Nos.	20								
	Sub Total of Item G											
	Sub Total Item II(Item A to G)	-	-									
	Total (Item I & Item II)											
	Grand Total (Item I & Item II) column No. 11 & 12 to be carried forward to Grand summary											

General Notes:

1. Bidder shall specify currency of each column in any freely convertible currency in accordance with ITB 12.
2. All other equipment/ accessories / work not mentioned above but deemed necessary by Employer/ Contractor for the completion of the work and its successful / smooth operation will be considered a part of the scope of work / supply under the contract.
3. In case of discrepancy between unit price and total price, unit price will prevail and the payment will be made accordingly.
4. Any other item deemed necessary by the bidder for the successful completion and operation of the project as per design and not quoted above may also be quoted separately and mentioned herewith prior to the Bid submission.
5. Any item/ sub-item and its quantity not mentioned above or not quoted separately by the bidder in his bid, shall not be paid after the award of the Contract to the successful bidder.
6. The above stated quantities are estimated and will be used for tender evaluation. The actual quantities may vary(except the quantity mentioned as Lot) depending upon the approved drawings. However, the unit rates for shall remain firm and final.

Notes for Telecom Equipment:

1. The Contractor shall offer and supply Telecom equipment at 500kv Ludewala Grid Station for the C-5 direction that is fully compatible with the existing Telecom equipment and systems already installed under the Chashma-5 project. The proposed equipment shall ensure seamless integration and interoperability with the existing equipment, both from hardware and software/configuration perspectives, without adversely affecting the operation or performance of the existing Telecom network.

2. The Contractor shall coordinate closely with the Contractor responsible for the Chashma-5 Project for all interface, integration, testing and commissioning activities required for the complete Ludewala–Chashma-5 Telecom link.

Notes for Protection & Control Equipment:

1. Any other additional material / equipment if required to complete the protection scheme as per scope of work of grid station shall also be provided by the bidder without additional cost.

Schedule No. 2- Plant and Mandatory Spare Parts Supplied from within the Employer's Country

Item	Description	Unit	Qty	Unit Price[1]		Total EXW Price	Total Inland Transportation	Total Price[1] Local Currency	Sales and other Taxes
				Local Currency	EXW Price				
1	2	3	4	5	6	7=4x6	8	9=7+8	10
I	**500/220kV Ludewala Grid Station**								
A	**Transformers**								
1.	**525/√3/231/√3/23 kV Auto Transformer Bank**								
1.1.	525/√3/231/√3/23 kV, 250x3 MVA, Auto-Transformer Bank, complete with indoor & outdoor control cubicles, Marshaling Kiosk, bushings having extended creepage distance(31mm/kV), terminal connectors, MR Germany or equivalent make OLTC, Surge Arrestors for Tertiary winding, out of delta CT for tertiary winding, Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA and all other equipment and accessories as specified.	Set	2						
1.2	525//3/231//3/23 kV, 250 MVA, Spare Auto-Transformer Unit complete with outdoor control cubicles, bushings having extended creepage distance(31mm/kV), terminal connectors, MR Germany or equivalent make OLTC, Surge Arrestors for Tertiary winding, Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA and all other equipment and accessories as specified.	No.	1						
1.3	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for transformer bank, complete with all equipment and accessories as specified and with separate OGST for each transformer unit (i.e 3 Nos. OGST for each Transformer Bank).	Set	2						

1.4	Insulated bus bar (DURESCA make or equivalent) 4000A, 52kV for interconnection of tertiary bushings to form delta connection of tertiary windings of each auto-transformer bank, as specified, including steel protection box (for enclosing the tertiary bushings & surge arresters for tertiary windings) and all the accessories, attachments, fittings, fastenings, connectors, conductors, hardware, earthing materials etc. as required to complete the tertiary windings interconnections and surge arresters installation in all respects.	Set	2						
1.5	Neutral bus bar complete arrangement including but not limited to aluminum tubular conductor, post insulators with structures, all type of connectors etc. for **Auto Transformer Bank**.	Set	2						
	Sub Total of Item A	-	-	-	-		-		
B.	**550/√3kV Shunt Reactor Bank**								
1.	550/√3 kV,3x37 MVAR (at 500 kV) Shunt reactor Banks complete with local control cubicles, bushings having extended creepage distance(31mm/kV), Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA, terminal connectors and all other equipment and accessories as specified.	Sets	5						
2.	550/√3 kV,37 MVAR (at 500 kV) Single Phase Spare Shunt reactor unit with local control cubicles, bushings having extended creepage distance(31mm/kV), Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA, terminal connectors and all other equipment and accessories as specified.	No.	3						
3.	Marshaling Kiosks for Shunt Reactor banks.	No.	5						
4.	Neutral bus bar complete arrangement including but not limited to aluminum tubular conductor, post insulators with structures, all type of connectors etc. for two Shunt Reactor Banks and one spare unit.	Lot	5						
5.	Indoor auxiliary control Panel for shunt reactor banks with allied accessories.	No.	5						
6.	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for Shunt Reactor bank, complete with all accessories as specified and with	Set	5						

	separate OGST for each Shunt Reactor unit (i.e 3 Nos. OGST for each Shunt Reactor Bank).								
7.	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for Shunt Reactor single unit, complete with all accessories as specified and with separate OGST.	No.	3						
8.	Bank Selector Kiosk	No.	3						
9.	Any other equipment/material required to make shunt reactor banks, transfer bus and firefighting system operational.	Lot	1						
	Sub Total of Item B	-	-	-	-		-		
C.	**500kV Switch Yard Equipment**								
1.	Circuit Breaker SF6 Gas type, three pole, 550kV 3150A, 50kA 1 sec, with pre-insertion resistors, grading capacitor, busing having extended creepage distance(31mm/kV), 220V DC operating mechanism with local control cubicle, terminal connectors, steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.	Set	16						
2.	Bus Disconnector (without earthing switch), three pole, 550 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	29						
3.	Line Disconnectors (with earthing switch), three pole, 550 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	5						
4.	550 kV, 50kA(1-sec), single pole, 3000-2500:2000:1250:750/1A ratio, 5 core Current Transformers, cores having tapping (VA burdens 15,30,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance(31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure	No.	33						

	and all other allied accessories as specified.								
5.	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box (1 for each set of 3 No. CVTs), steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	18						
6.	Coupling Capacitor voltage transformer (CCVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, with carrier coupling accessories, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	10						
7.	Surge Arrestors 444 kV, 50kA, Single Pole with bushings having extended creepage distance(31mm/kV), terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.	No.	39						
8	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied accessories as per IEC 60273 & IEC 60168 and all other allied equipment & accessories as specified.	No.	116						
	Sub Total Item C	-	-						
D.	**500kV High Voltage Bus Work**								
1.	**String Assemblies**								
1.1	500 kV Double Tension String Assembly for 3×810mm^2 and 4×810mm^{2}Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, Extension/Jumper terminal, 160kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.								
	with turn buckle	Lot	1						
	without turn buckle	Lot	1						
1.2	500 kV Double Suspension String Assembly (V Type) for 3×810mm^2 and 4×810mm^2 Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, 160 kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete	Lot	1						

	with hardware and allied accessories as per tender specifications.								
2.	**Overhead Flexible Conductors**								
2.1	810 mm^2 Coreopsis Conductor as specified.	Lot	1						
3.	**Aluminum Tubular Conductor**								
3.1	Aluminum tubular conductor for connection between switchyard equipment as specified.	Lot	1						
4.	**Connectors, Hardware & Accessories**								
4.1	For 810 mm^2 Coreopsis Conductor as specified.	Lot	1						
4.2	For Aluminum tubular conductor of connection between switchyard equipment as specified.	Lot	1						
5.	**Steel Structure support 500kV Overhead Busses**								
5.1	**Beams**								
5.1.1	32m, Type V1 (Triple Coreopsis Conductor)	No.	5						
5.1.2	32m, Type V2 (Triple Coreopsis Conductor)	No.	15						
5.1.3	32m, Type V2X (Triple Coreopsis Conductor)	No.	5						
5.1.4	33m, Type V3G (Quad Coreopsis Conductor)	No.	16						
5.2	**Column**								
5.2.1	(30.75+9.25)m, Type C1(Triple Coreopsis Conductor)	No.	6						
5.2.2	(20+10.75+9.25)m, Type C3 (Quad Coreopsis Conductor)	No.	12						
5.2.3	(20+10.75+9.25)m, Type C3X (Quad Coreopsis Conductor)	No.	06						
5.2.4	20m, Type C4 (Quad Coreopsis Conductor)	No.	11						
5.2.5	(20+10.75+9.25)m, Type C5 (Triple Coreopsis Conductor)	No.	06						
5.2.6	18 m, (for Shunt Reactor transfer Bus Support)	No.	04						
	Sub Total Item D	-	-						
E.	**500kV Control, Protection & Metering System**								
1.	**Relay Panels**								
1.1	500 kV Line Distance Protection Relay Panel R11– Set-I as specified in Clause No. 1.11.1 of NGC Specifications P204:2025.	Nos.	05						
1.2	500 kV Line Distance Protection Relay Panel R12– Set-II as specified in Clause No. 1.11.2 of NGC Specifications P204:2025.	Nos.	05						
1.3	500/220 kV Auto Transformer Protection Relay Panel R13– Set-I as specified in Clause No. 1.11.3 of NGC Specifications P204:2025.	Nos.	02						
1.4	500/220 kV Auto Transformer Protection Relay Panel R14– Set-II as	Nos.	02						

	specified in Clause No. 1.11.4 of NGC Specifications P204:2025.								
1.5	500 kV Breaker Failure Protection Panels R15 as specified in Clause No. 1.11.5 of NGC Specifications P204:2025.	Nos.	04						
1.6	Trip Circuit Supervision Relay Panel Type R16 with 18 Nos. TCS of 220VDC as specified in Clause No. 1.11.6 of NGC Specifications P204:2025.	Nos.	04						
1.7	Bus Bar Protection Panels R17b for 500 KV Bus Bar I & II with Centralized type Low Impedance Busbar Protection relays covering 04 no. 500kV Dias and at least four (02) Nos. 500kV Future Dias. as specified in Clause No. 1.11.8 of NGC Specifications P204:2025.	Sets	02 i.e., 01 Set each for Bus Bar-I & Bus Bar-II						
2.	**Control Panels and Local Control Cubicles**								
2.1	500 kV Control Panel WCA2 for Line + Line Dia with BCUs and Mimic Control for One & a Half Breaker Scheme as specified in Clause No. 5.16.3 of NGC Specifications P204:2025.	Nos.	02						
2.2	500 kV Control Panel WCA1a for Line + Transformer Dia with BCUs and Mimic Control for One & a Half Breaker Scheme as specified in Clause No. 5.16.1 of NGC Specifications P204:2025.	Nos.	02						
2.3	500 kV Combined Protection & Control Panel WRCA20 for Shunt Reactor with BCUs and Mimic Control as specified in Clause No. 5.16.7 of NGC Specifications P204:2025.	Nos.	05						
2.4	Local Control Cubicles for 500 kV T/Line side Breakers S1 (as per site work-scope requirements) as specified in Clause No. 3.21.10 of NGC Specification P204:2025.	Nos.	05						
2.5	Local Control Cubicles S2 for 500 kV Transformer side Breakers (as per site work-scope requirements) as specified in Clause No. 3.21.11 of NGC Specification P204:2025.	Nos.	02						
2.6	Local Control Cubicles for 500 kV Middle Breakers S3 (as per site work-scope requirements) for line-line Dia as specified in Clause No. 3.21.12 of NGC Specification P204:2025.	Nos.	04						
2.7	Local Control Cubicles for 500 kV Shunt Reactor side Breakers S4 (as per site work-scope requirements) as specified in Clause No. 3.21.13 of NGC Specification P204:2025.	Nos.	05						
2.8	**SAS / SCADA Equipment at Ludewala**								
2.8.1	Design, Manufacture and Supply of Standalone Gateway Server in 1+1 configuration with firewall along with	Set.	1 set (2 Gate						

	cubicle for Gateway Equipment having dimension 2200x800x600, RAL7031 Color fitted with thermostat, hygrometer, Cooling Fan, lightening lamp etc. at 500KV G/S Ludewala as per NGC'S Gateway specifications such that fully functional with the SAS and remote end SCADA systems at NPCC Islamabad and BCC Jamshoro. All other miscellaneous and necessary items such as auxiliary relays, fans, MCBs, ELCB, links, terminals, test points, wiring, earthing, brass cable glands, FO cable glands, FO cables and connectors, lugs, ferrules, labels, power sockets, heater, humidity sensor, internal light to complete the scheme and installation.		way server with firewall & 2 Cubicles						
3.	**Miscellaneous Panels**								
3.1	Fault Recorder Set of Panels for 500 & 220(for subject scope and for at least 04 nos. future line bays and 02 nos. transformer bays) systems as per Clause No. 3.24.1 & 3.24.2 of NGC Specifications P-204:2025	Set	01 complete set of Panels						
3.2	Fiber Optic Patch/Routing Panel(s) Set I type FOP1a as specified in Clause No. 5.19.1 of NGC Specification P204:2025.	Set	01 complete Set of Panels						
3.3	Fiber Optic Patch/Routing Panel(s) Set II type FOP2a as specified in Clause No. 5.19.2 of NGC Specification P204:2025.	Set	01 complete Set of Panels						
3.4	Station Level Interfacing Panel Set I type SLI1 as specified in Clause No. 5.19.3 of NGC Specification P204:2025.	Nos.	01						
3.5	Station Level Interfacing Panel Set II type SLI2 as specified in Clause No. 5.19.4 of NGC Specification P204:2025.	Nos.	01						
3.6	Common BCU & Synch Panel for 500 kV system type CC2 as specified in Clause No. 5.19.6 of NGC Specification P204:2025.	Nos.	01						
3.7	Common BCU & Synch Panel for 220 kV system type CC3 as specified in Clause No. 5.19.7 of NGC Specification P204:2025.	Nos.	01						
3.8	As per NGC Specification P-204:2025 clause 5.4.5.10 Operator Workstation of Fan less Industrial Grade IEC61850-3, IEC61850 ed.2 and IEC62439-3 PRP compliant latest model processors along with;	Set	02						

	LED monitors (at least 30"), keyboard, mouse, UPS & allied accessories, printers, LAN Network, furniture stuff etc. in the light of technical provision & provided concept diagram.								
3.9	As per NGC Specification P-204:2025 clause 5.4.5.10 Engineering Workstation of Fan less Industrial Grade, IEC61850-3, IEC61850 ed.2 and IEC62439-3 PRP compliant latest model processors; LED monitors (at least 30"), keyboard, mouse, UPS & allied accessories, printers, LAN Network, furniture stuff etc. in the light of technical provision & provided concept diagram.	Set	01						
3.10	Large wall-mounted display along with all allied accessories, cables, etc. (at least 103") as specified NGC Specification P204:2025.	Set	01						
3.11	Latest version complete licensed SAS software & licenses along-with allied accessories/dongles for engineering & redundant operating workstations and servers (Licensed Software/dongles for configuration & testing/commissioning of complete SAS shall also be provided)	Set	01						
3.12	Colored Laserjet Network printer along-with associated LAN and all allied accessories	Nos.	02						
3.13	Alarm & Events Printer and Hard Copy Unit along with all allied accessories	Set	01						
3.14	Single core & Multi cores FO shielded cables as per relevant IEC standards along with allied accessories (including accessories for terminations/connections) & any other FO cables etc. for connections between Bay level and Station level equipment (s) / Ethernet switches / IEDs etc. as per scheme requirement/SAS concept diagram with 30% spare fibers in each multi core FO cable to make SAS functional. Each multi-core FO cable will be connected via. Optical Distribution Frames before connecting to any equipment/IEDs.	Lot	01						
3.15	As per NGC Specification P-204:2025 clause 5.4.5.11 Branded Laptop Computer (HP/Dell/Lenovo or equivalent) of following or higher specification: Processor: Core i7-Latest Generation Graphics: Integrated AMD (min dedicated 4GB GDDR5) RAM: 16GB DDR4 Solid State Drive: 1 TB SSD LED:15.6" Operating System: Windows 10 Professional (64 bit) Along with battery charger, UPS, Bag,	Nos.	02						

	cable, Drivers CDs, all type of engineering workstation, Servers, Gateways, SAS/IEDs licensed soft wares /dongles, configuration software/dongles, testing & commissioning software, etc. & Cables / Converters for Communication & tests with Protection Relays, Metering Equipment, FR, BCUs, server computers, Local SCADA/HMI, SAS Equipment(s) etc. Note: 01 no. Laptop for field formations and 01 no. Laptop for o/o DG (P&C ENGINEERINGE) NGC for setting, configuration & design work etc.								
3.16	All misc. equipment/material / panels not listed above but required for proper operation of protection, control, automation etc. equipment along with all allied schemes as specified in relevant NGC specifications and sample SAS concept diagram.	Lot	01						
3.17	All other necessary material/devices/relays/cables (i.e., tripping Relays, Auxiliary Relays, Contactor Relays, AC/DC MCBs, Terminal Blocks etc.,) required for proper operation/, integration of applicable scope of works (i.e., 220 kV Busbar Protection Scheme, 220 kV Breaker Failure Protection Scheme, Common Alarms Scheme, AC/DC Auxiliary Supply System etc., schemes) with existing system as per actual site requirements.	Lot	01						
4.	**Metering Panel**								
4.1	Metering panel 4-Line (without AC Power Transducers and paperless recorder) with four(4) Energy meters (accuracy class 0.2S) for 500kV Auto Transformer Bank & T/Line metering as per NGC specifications P-199:2008 and P202:2012 amended to date.	No.	2						
	Sub Total Item E	-							
F.	**AC & DC Auxiliary Supply System for 500kV Equipment**								
1.	415/230V AC-I & II Auxiliary Supply Panels for 500 kV System with both manual and automatic changeover facility plus automatic transfer switch for Diesel Generator as per requirement laid down in Employer's requirements and enclosed concept diagram.	Set	01 complete Set of Panels						
2.	220V DC-I & II Auxiliary Supply Panels for 500 kV system with both manual	Set	01 comp						

	& automatic change over facilities along-with DC emergency Busbars-I & II as per requirements laid down in Employer's Requirements and Concept Diagram.		lete Set of Panels						
3.	Inverter Panel(s) (consists of 6 kVA 220V DC / 230V AC, single phase, 50Hz AC Sine wave Inverters having 10 Nos. 6A, 10kA MCBs with each inverter) with Automatic & Manual Changeover facilities in the light of provided concept diagram.	Nos.	02						
4.	Lead acid battery bank, 220V, 600AH(minimum) complete with accessories as specified.	No.	2						
5.	Automatic static battery charger 220V, 100A(minimum) complete with accessories as specified.	No.	2						
	Sub Total Item F	-							
G.	**Telecommunication Equipment**								
A	**DESIGN, MANUFACTURE, SUPPLY OF TELECOM EQUIPMENT.**								
1	**DIGITAL POWER LINE CARRIER (DPLC) Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Chashma-5 on Circuit-1.**								
1.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
1.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.	No.	02						
1.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
1.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber	No.	01						

	interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.								
1.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and	No.	01						

	short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48V DC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards								
1.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
2	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Chashma-5 on Circuit-2.**								
2.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier,	No.	02						

	Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.								
2.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.	No.	02						
2.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
2.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions	No.	01						

	specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.								
2.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The	No.	01						

	complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards								
2.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
3	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Chashma-5 on Circuit-3.**								
3.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
3.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.	No.	02						
3.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
3.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management	No.	01						

	of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.								
3.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge	No.	01						

	Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards								
3.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
4	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture, Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Faisalabad West on Circuit-1.**								
4.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device,	No.	02						

	protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.								
4.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.	No.	02						
4.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
4.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key,	No.	01						

	software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.								
4.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket,	No.	01						

	identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards								
4.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
5	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture, & Supply of complete DPLC Communication & PSE System at 500kv G/S Ludewala direction 500kv Faisalabad West on Circuit-2.**								
5.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
5.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.	No.	02						
5.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
5.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF	No.	01						

	cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PABX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.								
5.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V	No.	01						

	AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards								
5.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
6	**OPTICAL FIBER TERMINAL EQUIPMENT (OLTE)** **Design, Manufacture, & Supply of new Optical Fiber Communication System (SDH+PDH) at 500kv G/S**								

	Ludewala and Integration with adjacent Grid Stations.								
6.1	**SDH STM-4 upgradeable to STM-16 Multiplexer (Optical Line Terminal Equipment) along with PDH Multiplexer in 1+1 protected configuration,** complete with external trip counters, fully compatible and integrable with the existing NGC's SDH & PDH Network, equipped with at least **eight (08) STM-4 upgradeable to STM-16 optical TX/RX directions** and having a minimum configuration/capacity comprising protected **2 Nos.** cross-connect, **2 Nos.** controller and **2 Nos.** synchronization functions**; 2 Nos. protected 32-E1 electrical interface capacity; 2 Nos. protected power supply modules; 2 Nos. protected 8-port Ethernet interface capacity; EOW function complete with service telephone and accessories; IEC 60870-5-101 interface providing at least 16 RS-232 ports; IEC 60870-5-104 interface providing at least 2×8 Ethernet (10/100 Mbps) ports; auxiliary and alarm functions; 2 Nos. 4/2-wire E&M interfaces, each having at least 8 ports; FXS/FXO voice-frequency subscriber interfaces providing at least 12 ports; fan units; IDF and DDF,** complete with all necessary hardware, connectors, cables, software, licenses, accessories and Network Management System required for installation, integration, testing and commissioning**. The complete specified MCP shall be accommodated and simultaneously operational within the offered equipment/chassis arrangement. The contractor shall submit the proposed chassis/rack layout, slot allocation and module-wise configuration demonstrating accommodation of all specified functions and interfaces.**	No.	01						
6.2	Self-supporting, floor-mounted swing-rack cubicle for SDH/PDH equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch,	No.	01						

	thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant power supply to the Digital PAX equipment, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, telephone and signalling cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards.								
6.3	Self-supporting, floor-mounted swing-rack cubicle for installation of **Digital Protection Signalling Equipment and Trip Command Counter racks,** dimensions **800 × 600 × 2200 mm,** fabricated from suitable sheet steel, **RAL 7031 color**, with **IP54 protection index** and hinged front door fitted with **6 mm thick tempered glass**. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-	No.	02						

	mounted indication/alarm lamps. It shall be provided with **two 220V AC utility sockets,** AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a **Type 2 AC Surge Protection Device (SPD)** at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with **48VDC input/output terminal blocks and 48VDC MCBs (1+1)** for redundant power supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and **48VDC SPDs** at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, protection signaling, trip command and communication cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable **NGC Specifications and relevant IEC standards.**								
6.4	All other ancillary & interface equipment/hardware including Fiber optic patch cords for interconnection between ODF Racks, interconnection between SDH Equipment ports & ODF Racks, interconnection between SDH equipment and Digital protection equipment required to make the Optical Fiber Communication system fully functional.	Lot	01						
6.5	Optical Distribution Frame (ODF) Panel (self-standing cabinet 800x600x2200 mm, RAL7031 Color, IP54 Protection Index, fixed frame, front & rear hinged doors	No.	01						

	with hand lock & key, without roof fan) installed with Six (06) Nos. 48-fiber connector slide/pullout type ODF Racks (Fiber Optic Patch Panels) equipped with pigtails, splicing trays and associated accessories required for termination of 48 Fibers and fitted on fixed frame in the cubicle, vertical rings/guides in front-left & front right sides ODF panel guiding & neat management of FO patch cords, rings/guides on horizontal bars in front of each ODF Rack for horizontal management of Patch cords, horizontal metallic channels/meshing on the inner-left & inner-right walls of the ODF panel for binding/dressing/management of FO Cables & extra FO Patch cords, air filters, light, 220VAC supply socket with input & output terminals block, thermostat & hygrometer etc., including splicing/jointing/termination of all fibers of the new & existing OPGW/FO cable links in the respective ODF racks and end-to-end test of all optical fibers links								
6.6	Approach Fiber Optic Cables (48-fibers, armored) with required hardware, material & accessories: 3. Double Circuit Line towards 500 kv G/S Chashma-5 (C-5): Two (02) Armored Fiber Optic Approach Cables (FOACs) shall be provided, installed, terminated and tested from each OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Ludewala in the direction of 500kv G/S Chashma-5 (C-5), corresponding to the two OPGWs installed on both peaks of the Double Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site. 4. Single Circuit Line towards 500 kv G/S Chashma-5 (C-5): One (01) Armored Fiber Optic Approach Cable (FOAC) shall be provided, installed, terminated and tested from the OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Ludewala in the direction of 500 kv G/S Chashma-5 (C-5), corresponding to the OPGW installed on one peak of the Single Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site. Double Circuit Line towards 500kv G/S Faisalabad West: Two (02)	Meter	5000						

	Armored Fiber Optic Approach Cables (FOACs) shall be provided, installed, terminated and tested from each OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Ludewala in the direction of 500kv G/S Faisalabad West corresponding to the two OPGWs installed on both peaks of the Double Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site.								
7	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Chasma-5 for Digital Teleprotection Link on Circuit-1.**								
7.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.	No.	01						
8	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Chasma-5 for Digital Teleprotection Link on Circuit-2.**								
8.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.	No.	01						
9	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Chasma-5 for Digital Teleprotection Link on Circuit-3.**								
9.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable	No.	01						

	terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.								
10	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Faisalabad West for Digital Teleprotection Link on Circuit-1.**								
10.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.	No.	01						
11	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500Kv G/S Ludewala direction 500kv G/S Faisalabad West for Digital Teleprotection Link on Circuit-2.**								
11.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.	No.	01						
12	**48V DC POWER SUPPLY SYSTEM (UPS) FOR TELECOM SYSTEM Design, Manufacture & Supply of complete 48V DC Power Supply System at 500KV G/S Ludewala.**								
12.1	Standalone Lead Acid Battery Bank, 48V DC, Plante Type, 24 Cells, 1200 Ah, complete with battery mounting racks of approved design, electrolyte fluid, interconnecting cables, lugs/connectors, inter-cell connectors, battery maintenance kit, 48V DC fuses with fuse box and accessories for battery protection, installation materials, DC cables as required, and all necessary hardware and accessories for complete installation, testing and commissioning of the 48V DC battery bank, in accordance with the applicable NGC/NGC Specifications.	No.	01						

12.2	Standalone automatic, fully solid-state battery chargers, 48V DC, 300 A continuous output rating each, with float, boost and manual equalizing charging facilities, independent control units, automatic charger changeover/load-sharing arrangement, complete with necessary protections, alarms, self-standing floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, complete with internal lighting, AC/DC cables, fuses/MCBs, installation materials, hardware and accessories for complete installation, testing and commissioning of 48VDC battery charger system in 1+1 redundant configuration, in accordance with applicable NGC/NGC Specifications.	No.	02						
12.3	48V DC Distribution Panel, protection index IP54, housed in a self-standing floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, complete with internal lighting, equipped with at least 15 Nos. 2-pole 10 A DC Circuit Breakers, 15 Nos. 2-pole 20 A DC Circuit Breakers, 10 Nos. 2-pole 25 A DC Circuit Breakers, and 2-pole DC MCBs (1+1) for input 48VDC power supply from battery chargers/batteries. Complete with internal wiring/cabling, connector/terminal blocks for incoming and outgoing 48VDC power connections/distribution, labels, cable glands, and all necessary materials, hardware and accessories for complete installation	No.	01						
12.4	220V AC Distribution Panel, IP54, housed in a self-standing floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, complete with internal lighting, equipped with at least 15 Nos. 2-pole, 10 A, 220 V AC Circuit Breakers, 2-pole 220 V AC MCBs for incoming supplies, complete with automatic changeover arrangement for two incoming 220 V AC sources and AC Surge Protection Device (SPD) for protection against supply surges. Complete with internal wiring/cabling, proper connector/terminal blocks for incoming and outgoing 220 V AC connections to each Telecom Panel, labels, cable glands, and all necessary materials, hardware and accessories for complete installation, testing and commissioning, in accordance with applicable NGC/NGC Specifications	No.	01						
13	**COOLING SYSTEM**								
13.1	Air Conditioning Units: Supply, installation, testing and commissioning of two (02) Floor-Mounted, DC Inverter Type Air Conditioning Units, each of 4 Ton	No.	02						

	capacity, in 1+1 redundant configuration, at 500kv G/S Ludewala, complete with all necessary indoor and outdoor units, refrigerant piping, insulation, condensate drain arrangement, power and control cables, mounting/supporting arrangements, isolators, protection devices and all other auxiliary/ancillary equipment and accessories required for complete and reliable operation. The two Air Conditioning Units shall operate alternately on a duty/standby basis through an automatic programmable time-based control mechanism, so that each unit operates for a pre-set period and automatically transfers duty to the other unit. In the event of failure of the duty unit, the standby unit shall automatically start to ensure continuous air-conditioning. The Air Conditioning Units shall be of a well-renowned and internationally recognized manufacturer/brand, acceptable to NGC/Engineer, and suitable for continuous operation under prevailing site environmental conditions.								
14	**PROGRAMMING & TESTING EQUIPMENT**								
14.1	Latest-generation professional laptop with Intel Core Ultra 9/Core i9 or AMD Ryzen 9 9000 Series or higher/equivalent processor, or the latest-generation processor offering equivalent or superior performance available at the time design approval with minimum 32 GB DDR5 RAM, 1 TB NVMe SSD, 15.6-inch or larger Full HD/2K LED display, integrated graphics, Gigabit Ethernet (RJ-45), USB-A, USB-C and HDMI/DisplayPort interfaces, TPM 2.0, UEFI/Secure Boot, and Windows 11 Professional 64-bit (genuine, licensed and latest supported version), complete with original battery, charger, carrying bag, required USB/serial/Ethernet adaptors, cables and accessories. The Contractor shall supply the latest-generation professional laptop meeting or exceeding the above minimum technical requirements and available from the OEM at the time of technical approval and actual delivery. The offered laptop shall not be an obsolete, discontinued or end-of-life model. Any newer processor, hardware platform or technology introduced by the OEM by the time of approval/delivery shall be acceptable, provided that its performance, functionality and compatibility are equal to or better than the specified requirements and it is approved by	No.	02						

	NGC. The laptop shall also be supplied with genuine, licensed and latest compatible programming, configuration, diagnostic and O&M software, including required drivers, firmware/configuration tools and licenses for SDH/PDH, DPLC, Digital PABX, Gateway and Digital Protection Signalling Equipment, including associated management systems. All software shall be compatible with the latest supplied laptop hardware and operating system and shall be provided with valid licenses, installation media/download entitlement, and necessary updates/upgrades required for operation of the supplied equipment.								
14.2	Supply of portable, multifunction RTU I/O Tester for testing and verification of Digital Inputs (DI), Digital Outputs (DO), Analog Inputs (AI) and Analog Outputs (AO) of RTU systems during installation, commissioning, maintenance and troubleshooting. The tester shall be capable of simulating and measuring the required digital status/control signals and analog signals, including 4–20 mA, 0–20 mA and DC voltage signals, as applicable to the installed RTU I/O modules. The equipment shall be complete with all necessary test leads, probes, connectors, adapters, power supply/battery, charger, carrying case and accessories required for complete RTU I/O testing, commissioning and maintenance, complete in all respects. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.	No.	3						
14.3	Supply of portable, multifunction Loop Calibrator for testing, calibration and verification of RTU, transducers, SCADA analog input/output signals and associated signal loops, capable of measuring and sourcing/simulating 4–20 mA and 0–20 mA signals, with loop power supply and suitable accuracy. The calibrator shall include all necessary test leads, probes, connectors, batteries, charger, carrying case and accessories required for complete testing and calibration work. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.	No.	3						
14.4	Supply of portable, multifunction Signal Generator suitable for testing, commissioning, maintenance and troubleshooting of Digital Power Line Carrier (DPLC) equipment and associated communication channels.	No.	3						

	The Signal Generator shall be capable of generating stable test signals at selectable frequencies and adjustable output levels for testing of speech, data and carrier/baseband circuits, as applicable. The equipment shall be suitable for checking channel continuity, attenuation, signal level, frequency response and associated transmission paths. The Signal Generator shall be complete with all necessary test leads, cables, connectors, adapters, power supply/battery, charger, carrying case and accessories required for complete testing of DPLC equipment and communication links. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.								
14.5	Supply of portable, multifunction Teleprotection Tester suitable for testing, commissioning, maintenance and troubleshooting of Digital Protection Signalling Equipment (DPSE), integrated Teleprotection facilities of DPLC equipment and associated Teleprotection communication channels. The tester shall be capable of simulating and receiving Teleprotection commands, including trip, permissive, blocking and other binary commands, and shall provide facilities for verification of end-to-end operation, measurement of command transmission time/channel delay, testing of channel security and dependability, and verification of working and protection paths, where applicable. The tester shall be supplied complete with all necessary test leads, cables, connectors, adapters, probes, interface modules, communication cables, software/licenses, power supply, batteries/charger, carrying case and all other accessories required for complete testing, commissioning and troubleshooting of Teleprotection equipment and channels. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.	No.	3						
14.6	Supply of portable, high-accuracy Selective Level Meter (SLM) suitable for testing, commissioning, maintenance and troubleshooting of DPLC equipment and communication channels. The Selective Level Meter shall be capable of selective measurement of signal levels at specified frequencies and shall provide facilities for measurement of carrier signal level, attenuation, frequency response, noise and	No.	3						

	interfering signals, as applicable to the DPLC system. The equipment shall be suitable for testing DPLC terminals, LMUs, carrier frequency cables and complete end-to-end PLC communication links. The SLM shall be supplied complete with all necessary test leads, coaxial cables, universal connectors, adapters, probes, power supply/battery, charger, carrying case and all other accessories required for complete testing and maintenance of DPLC/PLC equipment and communication channels. The equipment shall be of European make or equivalent, suitable for industrial/substation environment, complete in all respects.								
	Sub Total Item G	-							
H.	**220kV Switch Yard Equipment**								
1	Circuit Breaker SF6 Gas type, three pole, 245kV 3150A, 50kA 1 sec, 220V DC motor mechanism with local control cubicle, bushings having extended creepage distance(31mm/kV), terminal connectors along with steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.	Set	04						
2.	Bus Isolators(without earthing switch), three pole, 245 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	10						
4.	245 kV, 50kA(1-sec), single pole, 3000:2400:1200:600/1A ratio, 5 core Current Transformers, cores having tapping (VA burdens 15,60,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance (31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.	No.	12						
5.	Capacitor voltage transformer (CVTs), 245 kV, Single pole, 2 core, 220/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box,	No.	02						

	steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.								
6.	Surge Arrestors 198 kV, 50kA, with bushings having extended creepage distance, terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.	No.	06						
7.	245kV Post Insulator stacks, IEC type designation C10-1050 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied equipment & accessories as specified as per IEC 60273 & IEC 60168.	No.	33						
	Sub Total Item H	-							
I.	**245kV High Voltage Bus Work**								
1.	**String Assemblies**								
1.1	220 kV Double Tension String Assembly for 2×810mm^2 and 3×810mm^2 Al. Alloy conductor (Coreopsis) with Arcing Horn, Extension/Jumper Terminal, 160 kN (fog type) Disc insulators (18 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.(This also includes the String Assemblies to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).								
	With turnbuckle	Lot	1						
	Without turnbuckle	Lot	1						
1.2	220 kV Double Suspension String assembly for 2×810mm2 and 3×810mm^2 Al. Alloy conductor (Coreopsis) with Arcing Horn, 160 kN (fog type) Disc insulators (18 x 2 Nos.) etc. complete with hardware and allied accessories (This also includes the String Assemblies to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).	Lot	1						
3.	**Overhead Flexible Conductors**								
3.1	810 mm^2 Coreopsis Conductor as specified (This also includes the conductor to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).	Lot	1						
4.	**Aluminum Tubular Conductor**								
4.1	Aluminum tubular conductor for connection between switchyard	Lot	1						

	equipment.								
5.	**Connectors, Hardware & Accessories**								
5.1	For 810 mm^2 Coreopsis Conductor as specified.	Lot	1						
5.2	For the connection of existing switchyard equipment with upgraded Bus Bar of 3×810mm2 Al. Alloy conductor (Coreopsis) as specified.	Lot	1						
5.3	For Aluminum tubular conductor for connection between switchyard equipment as specified.	Lot	1						
6.	**Steel Structure support 245kV Overhead Busses**								
6.1	**Beams**								
6.1.1	Length 16m (Triple Coreopsis Conductor)	No.	08						
6.1.2	Length 16m (Double Coreopsis Conductor)	No.	07						
6.2	**Column**								
6.2.1	18.5+4m (Double Coreopsis Conductor)	No.	10						
6.2.2	13m (Triple Coreopsis Conductor)	No.	16						
	Sub Total Item I	-							
J.	**220kV Control, Protection & Metering System**								
1.	**Relay Panels**								
1.1	220 kV Breaker Failure Protection Panel Type R5 of Breaker Failure Relays (with 03Nos. BF Relays) as specified in Clause No. 1.12.5 of NGC Specifications P204:2025.	No.	02						
1.2	Trip Circuit Supervision Relay Panel Type R6 with 18 Nos. TCS (18 Nos. of 220VDC) as specified in Clause No. 1.12.6 of NGC Specifications P204:2025.	No.	02						
2.	**Control Panels and Local Control Cubicles**								
2.1	220 kV Control Panel CA1b for 500/220 kV T/F(LV) + 220 kV T/Line with BCU and Mimic control for One & a Half Breaker Scheme (with 03 no. BCUs) as specified in Clause No. 5.17.2 of NGC Specifications P204:2025.	No.	02						
2.2	220 kV Local Control Cubicles S2 for 500/220 kV Transformer LV side Breakers (as per site work-scope requirements) as specified in Clause No. 3.22.15 of NGC Specification P204:2025.	No.	02						
2.3	Local Control Cubicles S3 for 220 kV Middle Breakers (as per site work-scope requirements) as specified in Clause No. 3.22.16 of NGC Specification P204:2025.	No.	02						
	Sub Total Item J	-							

K.	**AC & DC Auxiliary Supply System for 220kV Equipment**								
1.	415/230 V AC Auxiliary Sub-distribution Panel for 220 kV system (each for AC-I & AC-II) shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.	Nos.	02 Panels (01 No. for AC Busbar I & 01 No. of AC Busbar II)						
2.	220 V DC Auxiliary Sub-distribution Panel (each for DC-I & DC-II) for 220 kV system shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.	Nos.	02 Panels (01 No. for DC Busbar I & 01 No. of DC Busbar II)						
3.	Lead acid battery bank, 220V, 600AH(minimum) complete with accessories as specified to replace the existing 220V battery bank for 220kV Switchyard.	No.	2						
4.	Automatic static battery charger 220V, 100A (minimum) complete with accessories as specified to replace the existing battery chargers for existing 220kV switchyard.	No.	2						
	Sub Total Item K	-							
L	**11kV Equipment**								
1.	11.5/ 0.415 kV, 630kVA Pad Mounted Transformer (Alternate-III) along with all allied equipment and accessories as specified.	No.	2						
2.	11kV Metal clad Indoor type Switchgear Outgoing Panel VCB, 630A, 25kA Breaking Capacity as per NGC/ WAPDA Specification P-44:2018	No.	02						
3.	3-Core XLPE Power Cable 15,000 Volts, 4/0AWG including termination kits and accessories as specified.(for connection of 11.5/0.415kV Pad mounted transformer with Outgoing Panels)	Lot	1						
	Sub Total Item L	**-**	**-**	**-**					
M.	**Substation General Equipment**								

1.	**Substation Grounding System for 500kV, 220kV Switchyard and Buildings.**								
	Grounding System for entire Substation (for 50kA, 1 sec), indoor / outdoor equipment, control house building, control / relay room, generator room switchyard door / fence etc.								
1.1	Copper conductor 185mm^2(minimum).	Lot	1						
1.2	Earthing Rod 3 m(minimum) long as specified.	Lot	1						
1.3	Cartridges and Moulds with holding clamp.	Lot	1						
1.4	Grounding Connectors	Lot	1						
2.	**Overhead Shieldwire for 500kV & 220kV switchyard.**								
2.1	9 mm (7/3.0 mm) dia Galvanized Steel wire as specified.	Lot	1						
2.2	Assembly for 9 mm Earth wire fitting complete with all accessories as specified.	Lot	1						
3.	**Cables and Accessories.**								
3.1	Control and small power cables with all accessories	Lot	1						
3.2	Cable trays, racks, supports, cable conduits etc.	Lot	1						
4.	**Diesel Generator** 625 kVA, 415 V Standby Diesel Generator along with automatic changeover switch and all other equipment and accessories as specified.	No.	1						
5.	Out Door switchyard Lighting System as specified.	Lot	1						
6.	Mobile fire extinguisher for switchyard area.	No.	60						
7.	Fire extinguisher for control and relay buildings(wall mounted)	No.	20						
	Sub Total Item M	-	-	-					
N.	**Erection & Testing Equipment and Maintenance Tools**								
1	Phase sequence indicator as specified of Megger UK or approved Equivalent.	No.	1						
2	Primary current injection test sets specified of Megger UK or approved Equivalent.	No.	1						
3	Secondary injection relay test set as specified of Megger UK or approved Equivalent.	No.	1						
4	Digital phase angle meter as specified of Megger UK or approved Equivalent.	No.	1						
5	HV insulation resistance tester as specified of Megger UK or approved Equivalent.	No.	1						

6	Standard multi-range multi-meter as specified of Megger UK or approved Equivalent.	No.	4						
7	Clip on digital ammeter/voltmeter as specified of Megger UK or approved Equivalent.	No.	4						
8	Dielectric testing set for insulating oil as specified.	No.	1						
9.	Earth resistance testing set of Megger UK or approved Equivalent.	No.	1						
10.	SF6 Gas leak detector complete with accessories.	No.	1						
11.	Temporary earthing device for 500kV, 220 kV and 132 kV Switchyards.	No.	2						
12.	Selective level meter, including battery set and adapter.	No.	1						
13.	Level generator including battery set.	No.	1						
14.	Service Engineer's Tool Kit (Attach details of all equipment with unit prices)	No.	1						
15.	Circuit breaker analyzer Programme make, type TM-1600 as required or approved equivalent.	No.	1						
16.	Contact resistance measurement test set programme type micro ohmmeter MOM 200A or approved equivalent.	No.	1						
17.	Clip on current transformer small size with 1000/1A ratio as specified.	No.	2						
18.	C & DF test set as specified of Megger UK or Equivalent.	No.	1						
19.	Test equipment for verification of magnetization characteristics of CTs as specified of Megger UK or Equivalent.	No.	1						
20.	Portable phase shifter unit as specified.	No.	1						
21.	CT and VT polarity tester as specified.	No.	1						
22.	Test Leads complete with banana plugs								
	- long length leads	No.	60						
	- medium length leads	No.	60						
	- jumper leads	No.	30						
23.	Hi-Pot Test Set (A.C) as specified of Megger UK or Equivalent	Set	1						
24.	Hi-Pot Test Set (D.C) as specified of Megger UK or Equivalent	Set	1						
25.	Moveable Scaffolding: Height: 32 ft.	No.	1						
26.	Digital & microprocessor based energy meters (Alpha make) Test set	No.	1						
27.	Winding/Oil Thermometer Test Set	No.	1						
28.	Dew point test/SF6 Gas Purity Test Set.	Set	1						
29.	Clip on meter with provision of measuring power factor frequency and phase angle.	No.	1						
30.	Erection and maintenance equipment and tools for SF6 circuit breakers of each type used as specified	Set	1						

31.	Universal relay test set OMICRON 256 or approved equivalent	Set	1						
32.	Single phase variac as specified	Set	1						
33.	Three phase variac as specified	Set	1						
34.	Battery ground test set multiamp BGL or approved equivalent	No.	1						
35.	Battery test system TORREL 840 complete with extra load TXL870 software or equivalent	No.	1						
36.	Digital low resistance ohm meter for measuring transformer resistance	Set	1						
37.	Single Phase TTR test set Megger type 55005 or approved equivalent	Set	1						
38.	Microprocessor based universal relay testing set as specified of Megger UK or Equivalent.	Set	1						
39.	Sweep frequency response analyzer as specified	Set	1						
40.	Industrial Vacuum cleaner	No.	1						
	Sub Total of item N	-	-	-					
O.	**Mandatory Spare Parts**								
1.	**525/√3/231/√3/23 kV Auto Transformer Bank**								
1.1	500 kV bushing complete with gaskets and terminal connectors.	No	2						
1.2	245 kV bushing complete with gas kits and terminal connectors	No.	2						
1.3	Tertiary bushing complete with gas kits and terminal connectors.	No.	2						
1.4	Neutral bushing complete with gas kit and terminal connectors.	No	2						
1.5	DURESCA Busbar System complete for one Auto Transformer Bank	Set	1						
1.6	Bushing CT of each type used For								
	500 kV	Set	1						
	220 kV	Set	1						
	Tertiary	Set	1						
	Neutral	Set	1						
1.7	Cooling fans with motor	No.	6						
1.8	Motors of each type used	Set	1						
1.9	Pressure relief device replacement parts	Set	1						
1.10	Tap changer protection relay	No.	1						
1.11	Cover plate bolts, one of each type	Set	1						
1.12	Buchholz relay	No.	2						
1.13	Winding temperature indication system of each type.	Set	1						
1.14	Oil temperature indication system of each type	Set	1						
1.15	Oil level gauge of each type	Set	1						
1.16	Auxiliary relays and contactor, one of each type used	Set	1						

1.17	Tap changer motor drive	No.	1						
1.18	MCB's of each type used	Set	2						
1.19	Radiators for single phase auto-transformer.	Set.	1						
1.20	Remote tap position indicator.	No	1						
1.21	Silicagel	kg	60						
1.22	Set of Relays and Connectors for control cubicles	Set	1						
1.23	Set of Gaskits	Set	2						
1.24	Transformer Oil	liters	5,000						
1.25	Air Breather each type used	Set	2						
1.26	Surge Arrestor for Tertiary, Single pole	No.	2						
1.27	Post Insulator Used for Neutral Bus Bar with terminal connector	No.	2						
1.28	Spare parts for Nitrogen Injection fire explosion prevention System as recommended by manufacturer for operating life(25 years) of the equipment(bidder shall provide the detail along with price break down)	Set	2						
2.	**550/√3kV Shunt Reactor Bank**								
2.1	500 kV bushing complete with gaskets and terminal connectors.	No.	2						
2.2	Neutral bushing complete with gas kit and terminal connectors.	No.	2						
2.3	Gaskets with grease for cover, manholes and handholes comprising one of each type used.	Set	2						
2.4	Pressure relief device	No.	2						
2.5	Radiators for single phase reactor	Set.	2						
2.6	Buchholz relay	No.	2						
2.7	Winding temperature indication devices of each type.	Set	2						
2.8	Oil temperature indication devices of each type.	Set	2						
2.9	Oil gauges of each type	Set	2						
2.10	Bushing current transformer of each type used	Set	2						
2.11	Cover plates bolts one of each type	Set	2						
2.12	Auxiliary relays and contactors one of each type used	Set	2						
2.13	MCBs of each type used	Set	2						
2.14	Post Insulator Used for Neutral Bus Bar with terminal connector	No.	2						
2.15	Spare parts for Nitrogen Injection fire explosion prevention System as recommended by manufacturer for operating life(25 years) of the equipment(bidder shall provide the detail along with price break down)	Set	5						
3.	**550kV Circuit Breaker**								

3.1	Single Pole Circuit Breaker, SF6 Gas type, 550 kV, 3150 A, 50 kA 1 sec, complete with terminal connectors but without steel supporting structure.	No.	2						
3.2	Upper Part of single pole/ interrupting unit complete (i.e. porcelain and moving & fixed contact system)	No.	2						
3.3	Insulating Operating Rod	No.	2						
3.4	Fixed contact system complete	No.	2						
3.5	Moving contact system complete	No.	2						
3.6	Set of porcelain insulators of one pole (of interrupter and support insulator)	No.	2						
3.7	Operating mechanism complete	No.	2						
3.8	Auxiliary switch set	No.	2						
3.9	Safety pressure relief device for one pole	No.	6						
3.10	Closing Dashpot as applicable	No.	6						
3.11	Opening Dashpot as applicable	No.	6						
3.12	Closing coils	No.	4						
3.13	Trip coils	No.	4						
3.14	Set of gaskets for one pole	Set	6						
3.15	Molecular sieves/ Dryer Element for SF6 for one pole	No.	3						
3.16	SF6 gas in standard containers (sufficient for 6 breaker sets)	Lot	1						
3.17	Motors & pump of each type used.	Set	2						
3.18	Set of spares for operating mechanism (attach list)	Set	2						
3.19	Set of auxiliary relays used in control and auxiliary circuits	Set	4						
3.20	Set control switches and push buttons used in control and auxiliary circuits.	Set	4						
4.	**<u>550kV Disconnectors</u>**								
4.1	3-phase set of male and female contacts for Disconnectors.	Set	3						
4.2	3-phase set of male and female contacts for Earthing Switch.	Set	1						
4.3	Motor operated mechanism complete disconnector	Set	3						
4.4	Pedestal insulators for disconnector.	Set	3						

4.5	Auxiliary switches for disconnector	Set	3						
4.6	Auxiliary switches for Earthing Switch	Set	1						
4.7	Motor of each type used	Set	3						
4.8	Heater	No.	3						
4.9	Limit switches	Set	3						
4.10	Thermal Relay (thermo + humidity)	No.	3						
4.11	Contactor and fuses of each type used	Set	3						
4.12	Resistor, diodes and switches	Set	3						
4.13	Motor clutch	No.	3						
4.14	Motor brake	No.	3						
5.	**<u>550kV Current Transformer</u>**								
5.1	Current Transformers, single pole, 550 kV, 50 kA 1 sec, 5 core of current ratio **3000: 2500:2000:1250:750/ 1A** complete with terminal connectors but without steel supporting structure.	No.	3						
5.2	Gasket of each type used.	Set.	3						
6.	**<u>550kV Capacitor Voltage Transformer</u>**								
6.1	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.	No.	1						
6.2	MCB's one of each type used.	Set.	1						
6.3	Gasket of each type used.	Set	1						
7.	**<u>550kV Coupling Capacitor Voltage Transformer</u>**								
7.1	Coupling Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.	No.	1						
7.2	MCB's one of each type used.	Set.	1						
7.3	Drain Coil	No.	1						
7.4	Gasket of each type used.	Set	1						

8.	**444kV Surge Arrestors**								
8.1	Surge Arrestors 444 kV, 50kA, Single Pole complete with terminal connectors but without steel supporting structure.	No.	2						
9.	**550kV Insulators**								
9.1	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance without steel supporting structure.	No.	4						
9.2	Disc insulators (fog type) 160 kN.	No.	400						
10.	**245kV Circuit Breaker**								
10.1	Single Pole Circuit Breaker, SF6 Gas type, 245 kV, 3150 A, 50 kA 1 sec, complete with terminal connectors but without steel supporting structure.	No.	1						
10.2	Upper Part of single pole/ interrupting unit complete (i.e. porcelain and moving & fixed contact system)	No.	1						
10.3	Insulating Operating Rod	No.	1						
10.4	Fixed contact system complete	No.	1						
10.5	Moving contact system complete	No.	1						
10.6	Set of porcelain insulators of one pole (of interrupter and support insulator)	No.	1						
10.7	Operating mechanism complete	No.	1						
10.8	Auxiliary switch set	No.	1						
10.9	Safety pressure relief device for one pole	No.	3						
10.10	Closing Dashpot as applicable	No.	3						
10.11	Opening Dashpot as applicable	No.	3						
10.12	Closing coils	No.	2						
10.13	Trip coils	No.	2						
10.14	Set of gaskets for one pole	Set	3						
10.15	Molecular sieves/ Dryer Element for SF6 for one pole	No.	3						
10.16	SF6 gas in standard containers (sufficient for 6 breaker sets)	Lot	1						
10.17	Motors & pump of each type used.	Set	1						

10.18	Set of spares for operating mechanism (attach list)	Set	1						
10.19	Set of auxiliary relays used in control and auxiliary circuits	Set	2						
10.20	Set control switches and push buttons used in control and auxiliary circuits.	Set	2						
11	**245kV Bus Disconnector**								
11.1	3-phase set of male and female contacts for Disconnectors.	Set	1						
11.2	Motor operated mechanism complete disconnector	Set	1						
11.3	Pedestal insulators for disconnector.	Set	1						
11.4	Auxiliary switches for disconnector	Set	1						
11.5	Motor of each type used	Set	1						
11.6	Heater	No.	1						
11.7	Limit switches	Set	1						
11.8	Thermal Relay (thermo + humidity)	No.	1						
11.9	Contactor and fuses of each type used	Set	1						
11.10	Resistor, diodes and switches	Set	1						
11.11	Motor clutch	No.	1						
11.12	Motor brake	No.	1						
12	**245kV Current Transformer**								
12.1	Current Transformers, single pole, 245 kV, 50 kA 1 sec, 5 core of current ratio 3000: 2400:1200:600/ 1A complete with terminal connectors but without steel supporting structure.	No.	1						
12.2	Gasket of each type used.	Set.	1						
13.	**245kV Capacitor Voltage Transformer**								
13.1	Capacitor voltage transformer (CVTs), 245 kV, Single pole, 2 core, **220/√3kV / 110/√3V / 110/√3V voltage ratio,** complete with terminal connectors but without steel supporting structure.	No.	1						
13.2	MCB's one of each type used.	Set.	1						
13.3	Gasket of each type used.	Set	1						
14.	**198kV Surge Arrestors**								

14.1	Surge Arrestors 198 kV, 50kA, Single Pole complete with terminal connectors but without steel supporting structure.	No.	01						
15	**Control, Protection & Metering System**								
15.44	500 kV Line Distance Relay Set-I relay of each type used.	No.	01						
15.45	500 kV Line Distance Relay Set-II relay of each type used.	No.	01						
15.46	500/220 kV Auto Transformer Differential Relay Set-I of each type used.	No.	01						
15.47	500/220 kV Auto Transformer Differential Relay Set-II of each type used.	No.	01						
15.48	500/220 kV Auto Transformer REF Relay will all allied accessories of each type used.	No.	01						
15.49	500/220 kV Auto Transformer Tertiary Overcurrent & Earth Fault Relay	No.	02						
15.50	500 kV Centralized Type Low Impedance Bus Bar Differential Protection Relay.	No.	01						
15.51	500 kV Breaker Failure Relay.	No.	02						
15.52	220 kV Breaker Failure Relay.	No.	02						
15.53	Synch-Check Relay for 500kV	No.	02						
15.54	Synch-Check Relay for 220kV	No.	02						
15.55	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set I of each type used	Lot	01 (10% of installed quantity)						
15.56	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set II of each type used	Lot	01 (10% of installed quantity)						
15.57	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Differential Protection Relay Set I of each type used	Lot	01 (10% of installed quantity)						
15.58	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Differential Protection Relay Set II of each type used	Lot	01 (10% of installed quantity)						

15.59	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Breaker Failure of each type used	Lot	01 (10% of installed quantity)						
15.60	Power Supply Card & Analog I/O Card used for Bay Control Units of each type used	Lot	01 (10% of installed quantity)						
15.61	Trip Circuit Supervision Relay (220 VDC) of each type used.	No.	10						
15.62	High Speed, High Burden Self Reset Trip Relay (220 VDC) of each type used (08 NO + 2 NC).	No.	04						
15.63	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (18 NO + 2 NC).	No.	04						
15.64	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (08 NO + 2 NC).	No.	08						
15.65	Test Blocks for Relay of each type used.	No.	10% of installed quantity						
15.66	Test Plugs for Relays, BCUs, Metering equipment etc. compatible with test blocks of each type used.	No.	04						
15.67	All other auxiliary relays, miscellaneous relays, control switches and accessories of each type used in Protection Panels, Control Panels & Local Control Cubicles. (Minimum 10% of installed quantity).	Lot	01						
15.68	DC Supervision Relay (220 V DC) of each type used.	No.	06						
15.69	Bay Control Unit for 500 kV Bus-I side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.	No.	01						
15.70	Bay Control Unit for 500 kV Mid CB having max. nos. of I/O of type used.	No.	01						
15.71	Bay Control Unit for 500 kV Bus-II side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.	No.	01						
15.72	Bay Control Unit for 220 kV Bus-II side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.	No.	01						
15.73	Bay Control Unit for 500 kV Mid CB.) having max. nos. of I/O of type used.	No.	01						
15.74	Common Bay Control Unit of each type used for 500 kV system	No.	01						
15.75	Fiber Optic / Patch Cables Single core with connectors of each type of Maximum length used	Nos.	15						

15.76	Multi-core Fiber Optic Cable of Maximum cores and length type used	Nos.	03						
15.77	Bay Level Ethernet Switches of Each type used.	Nos.	02						
15.78	Station Level Ethernet Switches of Each type used	Nos.	01						
15.79	Fiber Optic Connectors used for cable terminations.	Nos.	20						
15.80	Optical Distribution Frames / Optical Fiber Splicing Cassette.	Nos.	04						
15.81	Fault Recorder IEDs each type used	Nos.	01						
15.82	Fault Recorder IEDs plug in modules each type used		Min. 10% of total quantity						
15.83	GPS Master Clock along with complete accessories	Set	01						
15.84	Auxiliary & control relays, Control & selector switches, indicating lamps, etc. used in BCU Panels & Control Panels. (Minimum 10% of installed quantity).	Lot	01						
15.85	AC & DC Auxiliary Services Panels relays, CBCT sensors, control equipment & allied accessories each type used for 500 kV and 220 kV System	No.	10% of total quantity used						
15.86	Operator Workstation of each type used.	Set	01						
16.	**Spare Connectors** 550kV & 245kV Spare connectors of each type, equal to 10% of quantity used (minimum one).	Lot	1						
17	**Telecom Equipment**								
17.1	**DPLC, Outdoor and PABX Equipment**								
17.1.1	DPLC Spare Modules/Cards sufficient for O&M of speech, data, tele-protection, power supply and CPU functions, with a minimum quantity of 2 Nos. of each module type or 10% of the approved design, whichever is higher. Spares shall be identical and fully compatible with the approved DPLC system and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item	Lot	01						
17.1.2	Spare Parts for Digital PAX System sufficient for O&M, with a minimum quantity of 2 Nos. of each module type or 10% of the approved design, whichever is higher. Spares shall be	Lot	01						

	identical and fully compatible with the approved Digital PAX system and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item								
17.1.3	Wideband tuning pot one of each type (for 500 kv) along with surge arrestor.	No.	04						
17.1.4	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 50kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
17.1.5	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 63kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
18.2	**OLTE (SDH+PDH)**								
18.2.1	Spare Parts for OLTE Equipment, sufficient for O&M, with a minimum quantity of 2 Nos. of each module type or 10% of the approved quantity of each module type, whichever is higher. Spares shall be identical and fully compatible with the approved equipment and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item.	Lot	01						
18.3	**Digital Protection Signalling Equipment**								
18.3.1	Spare Parts for Digital Protection Signalling Equipment, sufficient for O&M, with a minimum quantity of 2 Nos. of each module type or 10% of the approved quantity of each module type, whichever is higher. Spares shall be identical and fully compatible with the approved equipment and shall include all necessary accessories required for replacement and commissioning. Contractor shall provide a detailed item-wise list of all spares with quantity and individual unit price for each module/item.	Lot	01						

18.3.2	Fiber Optic patch cords, 10 Nos. SFPs of STM-4	No.	10						
18.3.3	Fiber Optic patch cords, 10 Nos. SFPs of STM-16	No.	5						
18.3.3	Fiber Optic patch cords	No.	10						
19	**SCADA EQUIPMENT**								
19.1	Transducers for Current Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	20						
19.2	Transducers for Voltage Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	20						
19.3	Transducers for Active Power Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	10						
19.4	Transducers for Reactive Power Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	10						
19.5	Transducers for Power Factor Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	10						
19.6	Transducers for Frequency Measurement, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	10						
19.7	Multifunction Transducers, of European make or equivalent, suitable for utility/substation applications, IEC compliant, rugged in construction, and suitable for specified environmental conditions, complete with all necessary accessories.	No.	10						

19.8	Cables and software for programming of transducers	No.	6						
	Sub Total of Item N	-	-	-					
	Sub Total of Item I (Item A to O)	-	**-**	**-**					
II	**Extension Works at 500/220/132kV Faisalabad West Grid Station**								
A	**500kV Switch Yard Equipment**								
1.	Circuit Breaker SF6 Gas type, three pole, 550kV 3150A, 63kA 1 sec, with pre-insertion resistors, grading capacitor, busing having extended creepage distance(31mm/kV), 220V DC operating mechanism with local control cubicle, terminal connectors, steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.	Set	3						
2.	Bus Disconnector (without earthing switch), three pole, 550 kV, 3150 A, 63 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	6						
3.	Line Disconnectors (with earthing switch), three pole, 550 kV, 3150 A, 63 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	2						
4.	550 kV, 63kA(1-sec), single pole, 3000-2500:2000:1250/1A ratio, 6 core Current Transformers, cores having tapping (VA burdens 15,30,30,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance(31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.	No.	9						

5.	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box (1 for each set of 3 No. CVTs), steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	2						
6.	Coupling Capacitor voltage transformer (CCVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, with carrier coupling accessories, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	4						
7.	Surge Arrestors 444 kV, 63kA, Single Pole with bushings having extended creepage distance(31mm/kV), terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.	No.	6						
8.	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied accessories as per IEC 60273 & IEC 60168 and all other allied equipment & accessories as specified.	**No.**	**28**						
	Sub Total Item A	-	-	-					
B.	**500kV High Voltage Bus Work**								
1.	**<u>String Assemblies</u>**								
1.1	500 kV Double Tension String Assembly for 3×810mm^2 and 4×810mm^{2}Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, Extension/Jumper terminal, 160kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.								
	with turn buckle	Lot	1						
	without turn buckle	Lot	1						
1.2	500 kV Double Suspension String Assembly (V Type) for 3×810mm^2 and 4×810mm^2 Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, 160 kN (fog type) Disc	Lot	1						

	insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.								
2.	**Overhead Flexible Conductors**								
2.1	810 mm^2 Coreopsis Conductor as specified.	Lot	1						
3.	**Aluminum Tubular Conductor**								
3.1	Aluminum tubular conductor for connection between switchyard equipment as specified.	Lot	1						
4.	**Connectors, Hardware & Accessories**								
4.1	For 810 mm^2 Coreopsis Conductor as specified.	Lot	1						
4.2	For Aluminum tubular conductor of connection between switchyard equipment as specified.	Lot	1						
5.	**Steel Structure support 500kV Overhead Busses**								
5.1	**Beams**								
5.1.1	32m (Triple Coreopsis Conductor) V1	Nos.	2						
5.1.2	32m (Triple Coreopsis Conductor) V2	Nos.	**3**						
5.1.3	32m (Triple Coreopsis Conductor) V2X	Nos.	1						
5.1.4	33m (Quad Coreopsis Conductor) V3G	Nos.	2						
5.2	**Column**								
5.2.1	(30.75+9.25)m Type C1(Triple Coreopsis Conductor)	Nos.	2						
5.2.2	(20+10.75+9.25)m Type C3 (Quad Coreopsis Conductor)	Nos.	1						
5.2.3	(20+10.75+9.25)m Type C3X (Quad Coreopsis Conductor)	Nos.	1						
5.2.4	20m Type C4 (Quad Coreopsis Conductor)	Nos.	2						
5.2.5	(20+10.75+9.25)m Type C5 (Triple Coreopsis Conductor)	Nos.	2						
	Sub Total Item B	-							
C.	**500kV Control, Protection & Metering System**								
1.	**Relay Panels**								
1.1	500 kV Line Distance Protection Relay Panel R11– Set-I as specified **in Clause No. 1.11.1 of NGC Specifications P204:2025.**	Nos.	02						
1.2	500 kV Line Distance Protection Relay Panel R12– Set-II as specified **in Clause No. 1.11.2 of NGC Specifications P204:2025.**	Nos.	02						

1.3	500 kV Breaker Failure Protection Panels R15 as specified **in Clause No. 1.11.5 of NGC Specifications P204:2025.**	Nos.	01						
1.4	Trip Circuit Supervision Relay Panel Type R16 with 18 Nos. TCS of 220VDC as specified **in Clause No. 1.11.6 of NGC Specifications P204:2025.**	Nos.	01						
2.	**Control Panels and Local Control Cubicles**								
2.1	Common BCU & Synch Panel for 500 kV system type CC2 **as specified in Clause No. 5.19.6 of NGC Specification P204:2025.**	Nos.	01						
2.2	500 kV Control Panel WCA2 for Line + Line Dia with BCUs and Mimic Control for One & a Half Breaker Scheme **as specified in Clause No. 5.16.3 of NGC Specifications P204:2025.**	Nos.	01						
2.3	Local Control Cubicles for 500 kV T/Line side Breakers S1 (as per site work-scope requirements) **as specified in Clause No. 3.21.10 of NGC Specification P204:2025.**	Nos.	02						
2.4	Local Control Cubicles for 500 kV Middle Breakers S3 (as per site work-scope requirements) for line-line Dia as specified **in Clause No. 3.21.12 of NGC Specification P204:2025.**	Nos.	01						
2.5	**SAS / SCADA Equipment at Faisalabad West**								
2.5.1	Modification and expansion of the existing Gateway system installed at 500kV G/S Faisalabad West for incorporation of additional SCADA signals associated with the two new bays towards 500kv Ludewala, in accordance with the approved I/O Signal List and NGC Gateway specifications. The scope shall include Gateway database expansion, signal/point configuration, required hardware/ interface modules, communication ports, software and licenses, wherever required, to accommodate and process the additional signals from the two new bays. All necessary accessories, including cables, connectors, terminals, wiring, patching and other hardware/software required for complete modification and expansion of the existing Gateway shall be included. The Contractor shall ensure that the existing Gateway remains fully operational and that the expansion has adequate capacity for the additional signals without affecting existing services	Lot	01						
3	**SAS / Miscellaneous Panels**								

3.1	All material required for Substation Automation System (SAS) integration of the subject extension scope of work with the existing Substation Automation System (SAS).	Lot	01						
3.2	All necessary material/devices/relays (i.e., tripping Relays, Auxiliary Relays, Contactor Relays, AC/DC MCBs, Terminal Blocks etc.,) required for proper operation/integration and completion of applicable scope of works (i.e., Busbar Protection Scheme, Breaker Failure Protection Scheme, Substation Automation System, Common Alarms Scheme, AC/DC Auxiliary Supply System etc., schemes) as per actual site requirements.	Lot	01						
4.	**Metering Panel**								
4.1	Metering panel 4-Line (without AC Power Transducers and paperless recorder) with two (2) Energy meters (accuracy class 0.2S) for 500kV Line metering as per NGC specifications P-199:2008 and P202:2012 amended to date.	No.	1						
	Sub Total Item C	-							
D.	**AC & DC Auxiliary Supply System for 500kV Equipment**								
1.	415/230 V AC Auxiliary Sub-distribution Panel for 500 kV system (each for AC-I & AC-II) shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.	No.	02 Panels (01 No. for AC Busbar I and 01 No. of AC Busbar II)						
2.	220 V DC Auxiliary Sub-distribution Panel (each for DC-I & DC-II) for 500 kV system shall be provided as per Drawings in volume-III and as per requirements laid down in Employer's Requirements.	No.	02 Panels (01 No. for DC Busbar I and 01 No. of DC Busbar II)						
	Sub Total Item D	-							

E.	**Substation General Equipment**								
1.	**Substation Grounding System for 500kV Switchyard and Building.**								
	Grounding System for Extended Portion of Substation(for 63kA, 1 sec), indoor / outdoor equipment, control house building, control / relay room, switchyard door / fence etc.								
1.1	Copper conductor 185mm^2 (minimum).	Lot	1						
1.2	Earthing Rod 3 m long as specified.	Lot	1						
1.3	Cartridges and Moulds with holding clamp.	Lot	1						
1.4	Grounding Connectors	Lot	1						
2.	**Overhead Shieldwire for Extended portion of 500kV Switchyard.**								
2.1	9 mm (7/3.0 mm) dia Galvanized Steel wire as specified.	Lot	1						
2.2	Assembly for 9 mm Earth wire fitting complete with all accessories as specified.	Lot	1						
3.	**Cables and Accessories.**								
3.1	Control and small power cables with all accessories	Lot	1						
3.2	Cable trays, racks, supports, cable conduits etc.	Lot	1						
4.	Out Door switchyard Lighting System for extended portion of 500kV switchyard as specified.	Lot	1						
5.	Mobile fire extinguisher for switchyard area.	No.	8						
	Sub Total Item E	-							
F.	**TELECOM EQUIPMENT**								
1	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture & Supply of complete DPLC Communication & PSE System at 500kv G/S Faisalabad West direction 500kv Ludewala on Circuit-1.**								
1.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150A, 63kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
1.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters,	No.	02						

	protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.								
1.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
1.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PAX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other	No.	01						

	relevant standards specified in the Tender Documents.								
1.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards	No.	01						

1.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
2	**DIGITAL POWER LINE CARRIER (DPLC)** **Design, Manufacture & Supply of complete DPLC Communication & PSE System at 500kv G/S Faisalabad West direction 500kv Ludewala on Circuit-2.**								
2.1	500kv Line trap wide band, dry type (air-cooled), 1 mH (min. inductance), 3150, 63kA (3sec), 300kHz (min. bandwidth) at a blocking impedance of 600Ω with tuning device, protective device, pedestal insulator, HV Connector, Jumper Clamp, Steel Supporting Structure, Bird Barrier, Civil foundation, if required & all other allied accessories as per NGC Specifications and IEC 60353.	No.	02						
2.2	Wideband Line matching unit, minimum PEP 1000 watts phase-to-phase coupling, with coupling filters, protection circuits, all accessories and material etc. required for a complete installation & commissioning with Balancing Transformer.	No.	02						
2.3	High frequency (HF) carrier cables (unbalanced & armored) to be laid separately from each LMUs at the gantry to DPLC Equipment in Telecom Room including loops between the LMUs and between the DPLC sets, if required according to requirement at site.	Meter	1000						
2.4	DPLC terminal (minimum 80 watts) separate 19 inch rack, fully compatible & integrate-able with the existing NGC's Telecom Network, programmable with 2/4 wire E&M signaling, FXO/FXS subscriber interface, all digital interface cards, including MDF cables, with one (01) analogue speech channel, 3-5 digital speech channels (Phone/Fax/PABX; speech compression/ decompression, echo cancellation, digital management of signaling, call progress, etc.), and minimum 5 data channels of 4800 bps with 8 coded Tele-protection commands (V.24/V.28, V11 [X21, X24], G.703, etc.) based on IEC 60870-5 -101 & one	No.	01						

	data channel based on IEC 60870-5-104, digital transit filter and other interface cards required for data (SCADA interconnection), trip counters, LAN (Ethernet, TCP/IP, UDP, FTP & SNMP) interface & all other allied accessories. Teleprotection may be provided either as an integrated function of the DPLC or through a separate standalone DPSE, at the Bidder's/Contractor's option. In either case, a minimum of eight (08) independent coded Teleprotection/trip command channels in each direction shall be provided, complete with all necessary interfaces, monitoring, alarms, trip counters, testing facilities and accessories. All digital interface cards and modules shall provide their maximum available operational and functional capabilities without any dongle limitation, hardware key, software lock, license restriction or additional feature activation requirement for the functions specified under this Contract. The complete DPLC and Teleprotection system shall comply with the applicable requirements of NGC Specifications, IEC 61850, IEC 60495, IEC 60663, IEC 62488, and other relevant standards specified in the Tender Documents.								
2.5	Self-supporting, floor-mounted swing-rack cubicle for installation of DPLC and Trip Command equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant	No.	01						

	supply to each equipment rack, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of cables, segregation of AC, DC, signal and communication wiring, terminal blocks for all inward/outward wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards								
2.6	All other ancillary equipment such as Teleprotection cables, AC cable, DC cables of required sizes, multi-pair-telephone cables, multi-pair signal/data cables as per requirement, earth cables of required sizes, connectors, jumpers, mounting frames, fuses, relays, thimbles, nuts bolts, screws, plugs, glands, test leads/cables, adaptors etc. required to install the complete functional system	Lot	01						
3	**DIGITAL PRIVATE AUTOMATIC EXCHANGE (PAX)** **Design, Manufacture & Supply of complete Digital PAX/Telephone system at 500kv G/S Ludewala and interfacing/integration with PAX already installed at remote ends.**								
3.1	Digital Private Automatic Exchange (PAX) of capacity 36x36, 4-VoIP & 6xE1 interface, 02-Digital Subscriber Modules with 3rd party VoIP telephone sets and licenses for 08-SIP users, software & management system and modem completely compatible & integrate-able with NGC's existing Telephone Network including the associated cables, test leads/ cables/adaptors/tools,	No.	01						

	hardware and accessories etc. required to integrate the new PAX with the existing NGC's Telephone/PAX Network via new & existing DPLC & SDH/PDH channels complete in all respects (hardware-wise/software-wise & management-wise) for a fully functional Telephone/PAX system.								
3.2	Self-supporting, floor-mounted swing-rack cubicle for installation of Digital PAX equipment, dimensions 800 × 600 × 2200 mm, fabricated from suitable sheet steel, RAL 7031 color, with IP54 protection index and hinged front door fitted with 6 mm thick tempered glass. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with two 220 V AC utility sockets, AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a Type 2 AC Surge Protection Device (SPD) at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with 48VDC input/output terminal blocks and 48VDC MCBs (1+1) for redundant power supply to the Digital PAX equipment, together with suitable multifunctional DC protective circuit breakers/MCBs and 48VDC SPDs at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, telephone and signalling cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with	No.	01						

	all necessary hardware, accessories and installation materials, in accordance with applicable NGC Specifications and relevant IEC standards.								
3.3	Main Distribution Frame (MDF), 1200-pair capacity, complete with self-supporting floor-mounted cabinet of 800 × 600 × 2200 mm, RAL 7031 color, IP54 protection, hinged front door with 6 mm tempered glass, air louvers with filters, internal light, 220 V AC utility socket with input/output terminal blocks, thermostat and hygrometer. The MDF shall be equipped with Krone-type LSA disconnect modules or equivalent, protection fuse/Surge Arrestor magazines as required, terminal/module identification strips, cable guide rings and supports for proper cable routing and dressing, insertion tools, 2-pole disconnecting plugs, dummy plugs, test cords and patch cords, complete with suitable earthing arrangement, all necessary hardware and accessories for complete installation, testing and commissioning in accordance with applicable NGC Specifications.	No.	01						
3.4	Normal analogue telephone sets, complete with all standard calling, dialing, ring, hold and other required features, fully compatible and interoperable with the existing NGC telephone/PAX system, including all necessary cords, connectors, accessories and associated hardware required for complete and satisfactory operation	No.	12						
3.5	SIP Telephone Set. The SIP telephone shall support standard SIP protocol and shall be supplied complete with all required user licenses, power adapter/PoE compatibility, Ethernet patch cord, configuration, accessories and associated hardware/software required for complete and satisfactory operation	No.	06						
3.6	All other ancillary materials such as telephone cables, connectors, jumpers, harnesses, mountings frames, fuses, relays, nuts bolts etc. for a complete & functional system	Lot	01						
3.7	Pertinent equipment/material/hardware/boards/ software for the interfacing and integration (complete in all respects) of new PAX with existing PAX equipment already installed in NGC's Telecom Network.	Lot	01						

4.	**OPTICAL FIBER TERMINAL EQUIPMENT (OLTE) at 500kv G/S Faisalabad West and Integration with adjacent Grid Stations. (Contractor shall use the Existing OLTE)**								
4.1	Pertinent equipment, materials, hardware, interface cards/boards, software, licenses, accessories and all other ancillary items required for complete interfacing and seamless integration of the existing SDH/PDH equipment with the new SDH/PDH equipment to be installed at 500kv Ludewala Grid Station, complete in all respects.	Lot	01						
4.2	Double Circuit Line towards 500kv G/S Ludewala: Two (02) Armored Fiber Optic Approach Cables (FOACs) shall be provided, installed, terminated and tested from each OPGW Outdoor Joint Box (OJB) installed on the gantry at 500kv G/S Faisalabad in the direction of 500kv G/S Ludewala, corresponding to the two OPGWs installed on both peaks of the Double Circuit Transmission Line, to the respective ODF Panel in the Telecom Room as per actual requirement at site.	Meter	2000						
4.3	Self-supporting, floor-mounted swing-rack cubicle for installation of **Digital Protection Signalling Equipment and Trip Command Counter racks,** dimensions **800 × 600 × 2200 mm,** fabricated from suitable sheet steel, **RAL 7031 color**, with **IP54 protection index** and hinged front door fitted with **6 mm thick tempered glass**. The cubicle shall be complete with roof-mounted ventilation fan, filtered air louvers, internal LED light with door-operated switch, thermostat, hygrometer, anti-condensation heater and front-mounted indication/alarm lamps. It shall be provided with **two 220V AC utility sockets,** AC input/output terminal blocks, suitable multifunctional AC protective circuit breakers/MCBs for overcurrent and short-circuit protection, and a **Type 2 AC Surge Protection Device (SPD)** at the incoming AC supply with status indication/failure alarm contact, where applicable. The cubicle shall also be provided with **48VDC input/output terminal blocks and 48V DC MCBs (1+1)** for redundant power supply to each equipment rack, together with suitable multifunctional DC protective circuit	No.	01						

	breakers/MCBs and **48V DC SPDs** at the incoming DC supply for protection against transient surges. AC and DC SPDs shall be properly coordinated with the associated protective devices and connected to the station earth through suitable low-impedance earthing connections. The cubicle shall include horizontal/vertical cable management bars/mesh for proper routing and dressing of power, protection signaling, trip command and communication cables, suitable terminal blocks for all incoming/outgoing wiring, cable glands, gland plates, ferrules, lugs, cable markers, internal copper earth bar and bonding of all metallic parts, doors and swing frames. A document pocket, identification labels, wiring diagrams and terminal schedules shall also be provided. The complete cubicle shall be factory assembled, wired, tested and commissioned with all necessary hardware, accessories and installation materials, in accordance with applicable **NGC Specifications and relevant IEC standards.**								
4.4	Optical Distribution Frame (ODF) Panel (self-standing cabinet 800x600x2200 mm, RAL7031 Color, IP54 Protection Index, fixed frame, front & rear hinged doors with hand lock & key, without roof fan) installed with four (04) Nos. 48-fiber connector slide/pullout type ODF Racks (Fiber Optic Patch Panels) equipped with pigtails, splicing trays and associated accessories required for termination of 48 Fibers and fitted on fixed frame in the cubicle, vertical rings/guides in front-left & front right sides ODF panel guiding & neat management of FO patch cords, rings/guides on horizontal bars in front of each ODF Rack for horizontal management of Patch cords, horizontal metallic channels/meshing on the inner-left & inner-right walls of the ODF panel for binding/dressing/management of FO Cables & extra FO Patch cords, air filters, light, 220VAC supply socket with input & output terminals block, thermostat & hygrometer etc., including splicing/jointing/termination of all fibers of the new & existing OPGW/FO cable links in the respective ODF racks and end-to-end test of all optical fibers links	No.	01						

4.5	All other ancillary & interface equipment/hardware including Fiber optic patch cords for interconnection between ODF Racks, interconnection between SDH Equipment ports & ODF Racks, interconnection between SDH equipment and Digital protection equipment required to make the Optical Fiber Communication system fully functional.	Lot	01						
5	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500kv G/S Faisalabad West direction 500kv G/S Ludewala for Digital Teleprotection Link on Circuit-1.**								
5.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.	No.	01						
6	**DIGITAL PROTECTION SIGNALING EQUIPMENT Design, Manufacture, & Supply of new Digital Protection Signaling Equipment at 500kv G/S Faisalabad West direction 500kv G/S Ludewala for Digital Teleprotection Link on Circuit-2.**								
6.1	Digital protection signaling equipment for at least 8 commands, transmit/receive over SDH STM-4/16 Optical Line Terminal equipment, complete with all pertinent cables & connectors, accessories, test modules/ adaptors/connectors, disconnectable terminal blocks for interconnection with protection relays and with separate TX/RX trip command counter rack, etc.	01							
7	**48V DC POWER SUPPLY SYSTEM (UPS) FOR TELECOM SYSTEM AT 500KV G/S FAISALABAD WEST**								
7.1	All other ancillary & interface equipment/hardware including AC/DC Cables for 48V DC power supply connections from existing DC system to Telecom equipment to be installed under this contract in direction of 500kv G/S Ludewala to make the Optical Fiber Communication and DPLC system fully functional.	01							

G.	**Mandatory Spare Parts**								
1.	**<u>550kV Circuit Breaker</u>**								
1.1	Single Pole Circuit Breaker, SF6 Gas type, 550 kV, 3150 A, 63 kA 1 sec, complete with terminal connectors but without steel supporting structure.	1							
1.2	Upper Part of single pole/ interrupting unit complete (i.e. porcelain and moving & fixed contact system)	1							
1.3	Insulating Operating Rod	1							
1.4	Fixed contact system complete	1							
1.5	Moving contact system complete	1							
1.6	Set of porcelain insulators of one pole (of interrupter and support insulator)	1							
1.7	Operating mechanism complete	1							
1.8	Auxiliary switch set	1							
1.9	Safety pressure relief device for one pole	3							
1.10	Closing Dashpot as applicable	3							
1.11	Opening Dashpot as applicable	3							
1.12	Closing coils	2							
1.13	Trip coils	2							
1.14	Set of gaskets for one pole	3							
1.15	Molecular sieves/ Dryer Element for SF6 for one pole	1							
1.16	SF6 gas in standard containers (sufficient for 6 breaker sets)	1							
1.17	Motors & pump of each type used.	1							
1.18	Set of spares for operating mechanism (attach list)	1							
1.19	Set of auxiliary relays used in control and auxiliary circuits	2							
1.20	Set control switches and push buttons used in control and auxiliary circuits.	2							
2.	**<u>550kV Disconnectors</u>**								
2.3	3-phase set of male and female contacts for Disconnectors.	1							
2.4	3-phase set of male and female contacts for Earthing Switch.	1							

2.5	Motor operated mechanism complete disconnector	1							
2.6	Pedestal insulators for disconnector.	1							
2.7	Auxiliary switches for disconnector	1							
2.8	Auxiliary switches for Earthing Switch	1							
2.9	Motor of each type used	1							
2.10	Heater	1							
2.11	Limit switches	1							
2.12	Thermal Relay (thermo + humidity)	1							
2.13	Contactor and fuses of each type used	1							
2.14	Resistor, diodes and switches	1							
2.15	Motor clutch	1							
2.16	Motor brake	1							
3.	**550kV Current Transformer**								
3.1	Current Transformers, single pole, 550 kV, 63 kA 1 sec, 6 core of current ratio 3000:2500:2000:1250/ 1A complete with terminal connectors but without steel supporting structure.	1							
3.2	Gasket of each type used.	1							
4.	**550kV Capacitor Voltage Transformer**								
4.1	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.	1							
4.2	MCB's one of each type used.	1							
4.3	Gasket of each type used.	1							
5.	**550kV Coupling Capacitor Voltage Transformer**								
5.1	Coupling Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage complete with terminal connectors but without steel supporting structure.	1							
5.2	MCB's one of each type used.	1							

5.3	Drain Coil	1							
5.4	Gasket of each type used.	1							
6.	**444kV Surge Arrestors**								
6.1	Surge Arrestors 444 kV, 63kA, Single Pole complete with terminal connectors but without steel supporting structure.	1							
7.	**Control, Protection & Metering System**								
7.22	500 kV Line Distance Relay Set-I relay of each type used.	1							
7.23	500 kV Line Distance Relay Set-II relay of each type used.	1							
7.24	500 kV Breaker Failure Relay.	1							
7.25	Synch-Check Relay for 500kV	1							
7.26	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set I of each type used	01 (10% of installed quantity)							
7.27	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Distance Protection Relay Set II of each type used	01 (10% of installed quantity)							
7.28	Power Supply Card, Analog I/O Card and Binary I/O Card used for 500 kV Breaker Failure of each type used	01 (10% of installed quantity)							
7.29	Power Supply Card & Analog I/O Card used for Bay Control Units of each type used	01 (10% of installed quantity)							
7.30	Trip Circuit Supervision Relay (220 VDC) of each type used.	04							
7.31	High Speed, High Burden Self Reset Trip Relay (220 VDC) of each type used (08 NO + 2 NC).	02							
7.32	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (18 NO + 2 NC).	02							
7.33	High Speed, High Burden Trip & Lockout Relay (220 VDC) of each type used (08 NO + 2 NC).	04							

7.34	Test Blocks for Relay of each type used.	10% of installed quantity							
7.35	Test Plugs for Relays, BCUs, Metering equipment etc. compatible with test blocks of each type used.	04							
7.36	All other auxiliary relays, miscellaneous relays, control switches and accessories of each type used in Protection Panels, Control Panels & Local Control Cubicles. (Minimum 10% of installed quantity).	01							
7.37	DC Supervision Relay (220 V DC) of each type used.	06							
7.38	Bay Control Unit for 500 kV Bus-I side CB (Line + Transformer Dia.) having max. nos. of I/O of type used.	01							
7.39	Bay Control Unit for 500 kV Mid CB having max. nos. of I/O of type used.	01							
7.40	Fiber Optic / Patch Cables Single core with connectors of each type; maximum length used	15							
7.41	Multi-core Fiber Optic Cable of Maximum cores and length type used	03							
7.42	Fiber Optic Connectors used for cable terminations.	20							
	Sub Total of Item G								
	Total Item II(Item A to G)								
	Total of (Item I and Item II) Column 9 to be forwarded to Grand Summary								

[1]***Specify currency in accordance ITB 12.***

1. All other equipment/ accessories / work not mentioned above but deemed necessary by Employer/ Contractor for the completion of the work and its successful / smooth operation will be considered a part of the scope of work / supply under the contract.
2. In case of discrepancy between unit price and total price, unit price will prevail and the payment will be made accordingly.
3. Any other item deemed necessary by the bidder for the successful completion and operation of the project as per design and not quoted above may also be quoted separately and mentioned herewith prior to the Bid submission.
4. Any item/ sub-item and its quantity not mentioned above or not quoted separately by the bidder in his bid, shall not be paid after the award of the Contract to the successful bidder.
5. The above stated quantities are estimated and will be used for tender evaluation. The actual quantities may vary(except the quantity mentioned as Lot) depending upon the approved drawings. However, the unit rates for shall remain firm and final.

Notes for Telecom Equipment:

1. The Contractor shall offer and supply Telecom equipment at 500kv Ludewala Grid Station for the C-5 direction that is fully compatible with the existing Telecom equipment and systems already installed under the Chashma-5 project. The proposed equipment shall ensure seamless integration and interoperability with the existing equipment, both from hardware and software/configuration perspectives, without adversely affecting the operation or performance of the existing Telecom network.
2. The Contractor shall coordinate closely with the Contractor responsible for the Chashma-5 Project for all interface, integration, testing and commissioning activities required for the complete Ludewala–Chashma-5 Telecom link.

Notes for Protection & Control Equipment:

1. Any other additional material / equipment if required to complete the protection scheme as per scope of work of grid station shall also be provided by the bidder without additional cost.

Schedule No.3 - Design Services

Item	Description	Qty.	Unit Price[1] Local Currency	Total Price	Total Provincial Sales Tax
1	2	3	4	5 = 3 x 4	6
I	**Design Service for 500/220kV Ludewala Grid Station**				
A	**Design Services for 500/220kV Substation**				
1	Design of complete electrical, mechanical and associated civil works (considering seismic factor by following the Building Code of Pakistan- Seismic Provisions amended to date) of a up gradation of existing 220/132kV Ludewala Substation to 500/220/132kV Substation, including control house building, generator room, telecom and protection schemes complete in all respect along with all allied facilities as per international practice, ready to use, to house and install the plan supplied as per schedule 1, 2 & 4.	1 Lot			
B	**Design Services for Protection & Control**				
1	Bidder shall be responsible for Design and Supply of soft (in PDF & in Auto CAD) & hard copies of AC / DC Schematics & interconnection/interface wiring diagrams along-with terminal plans & cable schedules for Ludewala Grid station complete in all respect for upgradation work of 500kV and 220kV system (Bay / Dia wise) separately that shall include but not limited to the following. i. Single Line Diagram (SLD). ii. Protection & Metering Single Line Diagram (PMSLD). iii. Protection, Control & SAS Panels' detailed schematic drawings. iv. SAS Architecture/network SLD. v. Make, Type & Ordering Code of Protection, Control, Automation, Monitoring & Recording equipment. (Approval for the equipment shall be taken from o/o DG (P&C ENGINEERINGE) NGC before procurement.) vi. Interlock Logic diagrams/ software files for BCU/SAS in hard/software copies. vii. Trip & indications logic diagrams along-with signal lists and SAS logical nodes & addresses. viii. Control & Interlock logic diagrams in hard and soft-form.	1 Lot			

	ix.	SAS drawings, concept diagram & signal list (complete in all respect)				
	x.	Bay/Dia wise Interconnection & Interfacing drawings complete in all respect for Protection Panels, SAS panels/equipment, BCU Control Panels, Local Control Cubicles (Panels), Fault Recorder Panels, Event recorder Panels, Metering Panels, Station-level Interfacing panels, GPS equipment, Bay-level FO patch/routing panels, Synchronizing Panels, Incoming/Outgoing Panels, AC/DC Auxiliary Supply Panels for 500/220 kV system, AC/DC Auxiliary Supply Panels for 500/220 kV system Switchyard equipment etc. (i.e. Auto transformer, CTs, PTs, Circuit Breaker, Isolator, Earth Switch etc. and any other drawing deemed necessary.).				
	xi.	Parallel operation of 500/220kV Auto transformers via. BCU, SAS, Gateway and ACP.				
	xii.	Station level and Bay level networking schematics & interconnections drawings.				
	xiii.	Common BCU and Patch Distribution Panel drawings.				
	xiv.	Station level and Bay level FO interfacing panel drawings.				
	xv.	GPS equipment & panel schematic drawings & interconnections.				
	xvi.	Fault Recorder system signal list & complete interconnections and schematics				
	xvii.	Modified Schematic Drawings of existing 220 kV Busbar, Breaker Failure, Common Alarm, AC/DC Auxiliary Supply System etc., or any other allied schemes for interfacing of new 500/220 kV System with existing 220 kV system.				
	xviii.	All other necessary schematic & interconnection wiring diagrams				
	xix.	Factory As-Built Drawings of all above items after attending all discrepancies/ shortcomings communicated by office of DG (P&C ENGINEERINGE) NGC during design review & inspection stage.				
	xx.	Final Site As-Built Drawings of all above items after energization of switching station & incorporating any modification(s) made during site execution works.				
	xxi.	Relay Setting Calculations for applicable scope of works.				
	xxii.	Copies of Generated Project Files and Editable Project Files, Substation Configuration Description (SCD) Files, BCU IED Capability Description (ICD) & Configured IED Description (CID) files, Protection relays Fault Recorder ICD & CID files, relay setting files in software format during course				

	of project and final as-built or any other files deemed necessary (complete in all respects). Any other drawing, interconnection, schedule, plan deemed necessary.				
2	Programming, testing & designing SAS system covering existing & future scope of work of editing, programming, testing , troubleshooting & configuration of SAS HMI system (creation of project & SCD files), BCU editor software (control setting, interlock setting, HMI editor, addressing, configuring ICD files & generating CID files), Protection Relays (settings, addressing, configuring ICD files & generating CID files) testing software for GOOSE messages, programming & testing Ethernet switches, programming & testing Gateways, programming & testing GPS equipment, servers, cyber security solution/implementation etc. All the necessary software shall be provided at site and not limited to the details mentioned above to make the SAS system functional/testing/editing if required.	1 Lot			
3	Provide SAS Programming & Operational work instructions, training manuals in hard/ Software formats/ manuals (04 nos. each) complete in all respects but not limited in relation to maintenance, troubleshooting, testing & commissioning of SAS related equipment(s) such as BCUs (signal & software interlocking etc.) Workstations (operations, measurements, signals, controls & interlocks etc.), Engineer Workstations, server computers, GPS equipment, Station/Bay level Ethernet switches, BCUs, Fault Recorders, Event recorder, Relay IEDs, etc., addition & removal of signals, signal lists with addresses for communication with SAS Gateways etc., addition or change of defective equipment with same or different manufacturer, addition or interfacing of new line or transformer bays without interruption to SAS operations, SAS software & training manuals, Database programming software & training manuals, necessary testing software & user manuals, SAS networking & signal testing tools, etc.	1 Lot			
4	Design (as per NGC Specifications) of a complete and fully functional new SCADA system at 500 kV G/S Ludewala, comprising Gateway, Firewall and all associated hardware, software, interfaces and accessories, based on the ISMO-approved signal list, including all required signals for integration with the relevant Control Centers, complete in all respects.	1 Lot			
C	**Design Services for Telecom**				
1	Design (as per NGC specifications) of the tele-communication system of complete DPLC communication system comprising of Line Trap, LMU, HF Cable, Digital Power Line Carrier and tele-protection equipment at 500kv G/S Ludewala.	1 Lot			
2	Design (as per NGC specifications) of Optical Communication System comprising of OLTE (SDH+PDH), ODF, DDF, Patch cords, pigtails, armored FOAC and other accessories required for complete functional Optical Communication System at 500kv G/S Ludewala.	1 Lot			
3	Design (as per NGC specifications) of DC system comprising of Batteries, Battery Charger in (1+1) configuration, DC distribution and all other accessories required for complete functional system / equipment at 500kv G/S Ludewala.	1 Lot			
4	Design (as per NGC specifications) of the tele-communication system of complete PABX communication system at 500kv G/S Ludewala for establishment of trunks with remote ends via DPLC and OLTE as per approved numbering plan.	1 Lot			

II	**Design Service for 500kV Faisalabad West**				
A	**Design Service for 500kV Substation**				
1	Design of complete electrical, mechanical and associated civil works (considering seismic factor by following the Building Code of Pakistan- Seismic Provisions amended to date) for addition of two 500kV line bays at 500/220/132kV Faisalabad West Substation including telecom and protection schemes complete in all respect along with all allied facilities as per international practice, ready to use, to house and install the plan supplied as per schedule 1, 2 & 4.	1 Lot			
B	**Design Service for Protection & Control**				
1	Bidder shall be responsible for Design and Supply of soft (in PDF & in Auto CAD) & hard copies of AC / DC Schematics & interconnection/interface wiring diagrams along-with terminal plans & cable schedules for Faisalabad West Grid station complete in all respects for extension work of 500kV system (Bay / Dia wise) separately that shall include but not limited to the following. i. Single Line Diagram (SLD). ii. Protection & Metering Single Line Diagram (PMSLD). iii. SAS Architecture/network SLD. iv. Make, Type & Ordering Code of Protection, Control, Substation Automation System (SAS), Monitoring & Recording equipment. (Approval for the equipment shall be taken from o/o CE (P&C ENGINEERING) NGC before procurement.) v. Interlock Logic diagrams/ software files for BCU/SAS in hard/software copies. vi. Trip & indications logic diagrams along with signal lists and SAS logical nodes & addresses. vii. Control & Interlock logic diagrams in hard and soft form. viii. SAS drawings, concept diagram & signal list (complete in all respects) ix. Bay/Dia wise Interconnection & Interfacing drawings complete in all respect for Protection Panels, SAS panels/equipment, BCU Control Panels, Local Control Cubicles (Panels), Fault Recorder Panels, , Metering Panels, Station-level Interfacing panels, GPS equipment, Bay-level FO patch/routing panels, Synchronizing Panels, Incoming/Outgoing Panels, AC/DC Auxiliary Supply Panels for 500 kV system, AC/DC Auxiliary Supply Panels for 500 kV system Switchyard equipment etc. (i.e. Auto transformer, CTs, PTs, Circuit Breaker, Isolator, Earth Switch etc. and any	1 Lot			

	other drawing deemed necessary.). x. Station level and Bay level networking schematics & interconnections drawings xi. Common BCU and Patch Distribution Panel drawings xii. Station level and Bay level FO interfacing panel drawings. xiii. GPS equipment & panel schematic drawings & interconnections. xiv. Fault Recorder and Event Recording system signal list & complete interconnections and schematics xv. All other necessary schematic & interconnection wiring diagrams xvi. Factory As-Built Drawings of all above items (a to q) after attending all discrepancies/ shortcomings communicated by office of Chief Engineer (P&C ENGINEERING) NGC during design review & inspection stage. xvii. Final Site As-Built Drawings of all above items (a to q) after energization of switching station & incorporating any modification(s) made during site execution works. xviii. Relay Setting Calculations for applicable scope of works. xix. Copies of Generated Project Files and Editable Project Files, Substation Configuration Description (SCD) Files, BCU IED Capability Description (ICD) & Configured IED Description (CID) files, Protection relays/Event & Fault Recorder ICD & CID files, relay setting files in software format during course of project and final as-built or any other files deemed necessary (complete in all respects). Any other drawing, interconnection, schedule, plan deemed necessary.				
2	Programming, testing & designing SAS system covering existing & future scope of work of editing, programming, testing, troubleshooting & configuration of SAS HMI system (creation of project & SCD files), BCU editor software (control setting, interlock setting, HMI editor, addressing, configuring ICD files & generating CID files), Protection Relays (settings, addressing, configuring ICD files & generating CID files) testing software for GOOSE messages, programming & testing Ethernet switches, programming & testing Gateways, programming & testing GPS equipment, servers, cyber security solution/implementation etc. All the necessary software shall be provided at site and not limited to the details mentioned above to make the SAS system functional/testing/editing if required.	1 Lot			
3	Provide SAS Programming & Operational work instructions, training manuals in hard/ Software formats/ manuals (04 nos. each) complete in all respects but not limited in relation to maintenance, troubleshooting, testing & commissioning of SAS related equipment(s) such as BCUs (signal & software interlocking etc.) Workstations (operations, measurements, signals, controls & interlocks etc.), Engineer Workstations, server computers, GPS equipment, Station/Bay level Ethernet switches, BCUs, Fault Recorders, Event recorder,	1 Lot			

	Relay IEDs, etc., addition & removal of signals, signal lists with addresses for communication with SAS Gateways etc., addition or change of defective equipment with same or different manufacturer, addition or interfacing of new line or transformer bays without interruption to SAS operations, SAS software & training manuals, Database programming softwares & training manuals, necessary testing softwares & user manuals, SAS networking & signal testing tools, etc.				
4	Design (as per NGC Specifications) for modification, expansion and integration of the existing Gateway system at 500 kV G/S Faisalabad West for incorporation of additional signals from two (02) new bays, including all required additional hardware, interface modules, software, configuration, programming, signal integration and associated accessories, complete in all respects.	1 Lot			
C	**Design Services for Telecom**				
1	Design (as per NGC specifications) of the tele-communication system of complete DPLC communication system comprising of Line Trap, LMU, HF Cable, Digital Power Line Carrier and tele-protection equipment at 500kv G/S Faisalabad West.	1 Lot			
2	Design (as per NGC specifications) of Optical Communication System comprising of OLTE (SDH+PDH), ODF, DDF, Patch cords, pigtails, armored FOAC and other accessories required for complete functional Optical Communication System at 500kv G/S Faisalabad West.	1 Lot			
3	Design (as per NGC specifications) of DC system comprising of Batteries, Battery Charger in (1+1) configuration, DC distribution and all other accessories required for complete functional system / equipment at 500kv G/S Faisalabad West.	1 Lot			
4	Design (as per NGC specifications) of the tele-communication system of complete PABX communication system at 500kv G/S Faisalabad West for establishment of trunks with remote ends via DPLC and OLTE as per approved numbering plan.	1 Lot			
TOTAL Column 5 to be carried forward to Grand Summary					

Name of Bidder _____

Signature of Bidder _____

[1]***Specify currency in accordance ITB 12.***

Schedule No. 4– Installation and Other Services

(a) Construction of associated Civil Works

BOQ FOR CIVIL WORKS FOR "UPGRADATION OF EXISTING 220/132KV LUDEWALA SUBSTATION TO 500/220/132 KV SUBSTATION AND ASSOCIATED EXTENSION WORK AT 500KV FAISALABAD WEST SUBSTATION"						
S.No	**Description**	**Unit**	**Qty.**	**Unit Price (Rs.)**	**Total Price (Rs.)**	**Total Provincial Sales Tax (Rs.)**
1	**2**	**3**	**4**	**5**	**6=4x5**	**7**
A. 500/220kV Ludewala Grid Station						
	Earth work					
1.1	Clearing and grubbing of the complete site area for bushes, vegetation trees, roots and weeds etc. as per Drawings, Specifications and as directed by the Engineer including dismantling of old civil works if any, disposal of debris away from site to any lead.	Lot	1			
1.2	Filling, levelling and compaction of the built-up substation area with fill material to raise the level of the area in horizontal layers of 200 mm thickness (max) compacted up to 95% modified Proctor Density as per approved Contour Plan and Specifications and as directed by the Employer representative	-	-			
1.2.1	Using borrow fill material as per NGC Specification with compaction 95% proctor density with mechanical means with any lead and lift for raising (after clearing, grubbing of site, joint level survey will establish the backfilling quantity).	Cu.m	75,000			
1.2.2	BackFilling with Using material excavated from the other foundations on site or cutting material within the site with compaction 95% proctor density with mechanical means	Cu.m	30,000			
Total of Item No.1						

2	**500kV Switchyard Equipment/Gantry Foundations**					
2.1	Supply and Construction of Reinforced Cement Concrete work for Equipment's and Gantry foundations having minimum cylinder crushing strength of 210 kg/cm2 at 28 days using Sulphate Resistant Cement(SRC) conforming to ASTM C-150 inclusive of excavation / cutting, dewatering (if any), lean concrete/P.C.C/blinding layer, reinforcement (Grade 60), shuttering, concreting, curing, bitumen coating (min two coats) below ± 0 Level on all concrete surfaces, compacted backfilling, leveling/ grading, slope protection (where necessary), removal of surplus earth from site area as directed by Engineer, installation of stubs / anchor bolts, capping & grouting under structure sole and in block-out etc.					
i.	Foundation for 500 kV Circuit Breakers (CB) (three poles) as per Specification and Drawing No. PDD/CG-466	Set	16			
ii.	Foundation for 500 kV Current Transformer (CT) as per Specification and Drawing No.PDD/CG-467	No.	33			
iii.	Foundation for 500 kV Bus/Line Isolators as per Specification and Drawing No.PDD/CG-430. One set means 06 foundations as per referred drawing.	Set	34			
iv.	Foundation for 500 kV Post Insulator (PI) as per Specification and Drawing No. PDD/CG-468	No.	116			
v.	Foundation for 500 kV Capacitor Voltage Transformer (CVT) and Coupling Capacitor voltage transformer (CCVTs) as per Specification and Drawing No. PDD/CG-469	No.	28			
vi.	Foundation for 500 kV Surge Arrester (SA) as per Specification and Drawing No. PDD/CG-470	No.	39			
vii.	Foundation for 500 kV Gantry (30.75+9.25m) C1 as per Specification and Drawing No. PDD/CG-583	No.	6			
viii.	Foundation for 500 kV Gantry (20+10.75+9.25) C3 as per Specification and Drawing No. PDD/CG-583	No.	12			

ix.	Foundation for 500 kV Gantry (20+10.75+9.25) C3X as per Specification and Drawing No. PDD/CG-583	No.	6			
x.	Foundation for 500 kV Gantry (20m) C4 as per Specification and Drawing No. PDD/CG-583	No.	11			
xi.	Foundation for 500 kV Gantry (20+10.75+9.25) C5 as per Specification and Drawing No. PDD/CG-583	No.	6			
xii.	Foundation for Local Control Cubicle (LCC) as per Specification and Drawing No. PDD/CG-475	No.	16			
xiii.	Foundation for Line Trap as per Specification and Drawing No. PDD/CG-476	No.	10			
xiv.	Foundation for Marshalling Kiosk as per Specification and Drawing No. PDD/CG-477	No.	7			
xv.	Foundation for Bank Selector Kiosk as per Specification and Drawing No. PDD/CG-477	No.	3			
xvi.	Foundation for 250x3 MVA Auto transformer bank including oil collection pits, fire walls, gravel and grating over entire foundation alonwith supply and installation of rails on each foundation as well as civil works for neutral bus etc complete in all respect as per Specification and Drawing No. PDD /CG-579 (Rev-01)	No.	2			
xvii.	Foundation for 250 MVA Spare Auto transformer unit including oil collection pit, gravel and grating over entire foundation along with supply and installation of rails on each foundation etc complete in all respect as per Specification and Drawing No. PDD/CG-584	No.	1			
xviii.	Foundation for 3x37 MVAR Shunt reactor Bank including fire walls, oil collection pits, gravel and grating over entire foundation along with supply and installation of rails on each foundation etc complete in all respect as per Specification and Drawing No. PDD /CG-579 (Rev-01)	No.	5			
xix.	Foundation for 37 MVAR (at 500 kV) Single Phase Spare Shunt reactor unit including fire walls, oil collection pits, gravel and grating over entire foundation along with supply and installation of rails on each foundation etc complete in all respect as per Specification and Drawing No. PDD/CG-584	No.	3			

xx.	Civil Works / foundations for nitrogen Injection Explosion Prevention and Fire Protention System for Transformer Bank, Shunt Reactor Bank and Shunt reactor spare uints etc. complete in all respect	Lot	1			
xxi.	Complete Civil Works/ foundation for neutral bus	Lot	1			
xxii.	Oil and Water Separation Tank	No.	4			
Total of Item No.2						
3	**220kV Switchyard Equipment/Gantry Foundations**					
3.1	Supply and Construction of Reinforced Cement Concrete work for Equipment's and Gantry foundations having minimum cylinder crushing strength of 210 kg/cm2 at 28 days using Sulphate Resistant Cement(SRC) conforming to ASTM C-150 inclusive of excavation / cutting, dewatering (if any), lean concrete/P.C.C/blinding layer, reinforcement (Grade 60), shuttering, concreting, curing, bitumen coating (min two coats) below ± 0 Level on all concrete surfaces, compacted backfilling, leveling/ grading, slope protection (where necessary), removal of surplus earth from site area as directed by Engineer, installation of stubs / anchor bolts, capping & grouting under structure sole and in block-out etc.					
i.	Foundation for 220kV Circuit breakers (CB) as per specifications and drawing No. PDD/CG-538. One set means 03 foundations as per referred drawing.	Set	4			
ii.	Foundation for 220kV Bus/Line Isolators (ISO) as per specification and drawing No. PDD/CG-539. One set means 03 foundations as per referred drawing.	Set.	10			
iii.	Foundation for 220kV Current Transformers (CT) as per specification and drawing No. PDD/CG-540	No.	12			
iv.	Foundation for 220kV CVT as per specification and drawing No. PDD/CG-540	No.	2			
v.	Foundation for 220kV Surge Arrester (SA) as per specification and drawing No.PDD/CG-542.	No.	6			
vi.	Foundation for 220kV Post Insulator (PI) as per specification and drawing No. PDD/CG-543.	No.	33			

vii.	Foundation for 220kV Gantry (18.5+4m) as per specification and drawing No.PDD/CG-546	No.	10			
viii.	Foundation for 220kV Gantry (13m) as per specification and drawing No.PDD/CG-547	No.	16			
Total of Item No.3						
4	**Switchyard Trenches, Pathways and Other Civil Works**					
4.1	Providing RCC cable trenches type 1, 2, 3 and 4, inclusive of precast RCC trench covers, all type of connections, slope, rain water drainage, supply & installation of tie channels/cable hangers embedded in walls etc. complete as per specification and drawing including expansion joints.					
i.	Cable Trench Type-1	Li.m	450			
ii.	Cable Trench Type-2	Li.m	1200			
iii.	Cable Trench Type-3	Li.m	800			
iv.	Cable Trench Type-4	Li.m	1000			
4.2	Providing RCC cable trenches type A, B, C and D, inclusive of precast RCC trench covers, all type of connections, slope, rain water drainage, supply & installation of tie channels/cable hangers embedded in walls etc. complete as per specification and drawing including expansion joints.					
i.	Cable Trench Type-A	Li.m	20			
ii.	Cable Trench Type-B	Li.m	250			
iii.	Cable Trench Type-C	Li.m	75			
iv.	Cable Trench Type-D	Li.m	150			
4.3	Supply and construction of cable trench crossing under transformer way and switchyard path complete in all aspects as per specification and drawing					
i.	Culvert for trench Type-1	Li.m	18			
ii.	Culvert for trench Type-2	Li.m	65			
iii.	Culvert for trench Type-3	Li.m	10			
4.4	Supply and construction of cable trench crossing under transformer way and switchyard path complete in all aspects as per specification and drawing					
i.	Culvert for trench Type-A	Li.m	10			
ii.	Culvert for trench Type-B	Li.m	20			
iii.	Culvert for trench Type-C	Li.m	10			
4.5	Supply and construction of draw pit with pumping arrangement for each draw pit individually as per	No.	10			

	specification and drawing and its connection with cable trenches.					
4.6	Design, Supply and Construction of Transformer way wide 6m with rails complete in all aspects as per specification and drawing No.	Li.m	250			
4.7	Design, Supply and Construction of Transformer way wide 4.6m with rails complete in all aspects as per specification and drawing No. PDW/TV-488	Li.m	200			
4.8	Design, Supply and Construction of RCC road 4.5m wide complete in all aspects as per specification and drawing No. PDW/TS-2616	Li.m	425			
4.9	Design, Supply and Construction of RCC road 4m wide complete in all aspects as per specification and drawing No. PDW/TS-2616	Li.m	1500			
4.10'	Design, Supply and Construction of RCC road 2.5m wide complete in all aspects as per specification and drawing No. PDW/TS-2616	Li.m	700			
4.11	Design, Supply and Construction of RCC road 2m wide complete in all aspects as per specification and drawing No. PDW/TS-2616	Li.m	100			
4.12	Dismantling of existing fence wall complete in all respect and as per engineer approval	Li.m	200			
4.13	Supply and construction of fencing around switchyard area, complete in all respects as per specifications and drawing No. PDW/TB-786.	Li.m	500			
4.14	Providing and fixing switchyard gate complete in all respects as per specification and drawing No. PDW/TS-512.	No.	1			
4.15	Supply and laying of 230mm RCC pipes under road complete in all respects.	Li.m	500			
4.16	Supply and installation of PVC conduit approved by Engineer for carrying miscellaneous cables from cable trenches to equipment as specified.					
	i. 50mm (2inch) dia along with accessories (i.e bends, joints)	Li.m	2000			
	i. 100mm (4inch) dia along with accessories (i.e bends, joints)	Li.m	1000			
	i. 150mm (6inch) dia along with accessories (i.e bends, joints)	Li.m	500			

4.17	Construction of switchyard surface water / rain / storm water drainage and cable trenches water drainage system, road crossings its disposal system, draw pits / soakage pits with its efficient disposal system having pumping arrangements (pump having minimum power 2HP and RCC pipe line minimum dia 225mm (9 inch) with proper jointing and its testing after filling the line with water for 24 hrs and noting leakage if any and accordingly make the improvement) to dispose water from switchyard to switchyard outside area approved by the Engineer complete in all respects including PVC/UPVC pipes with manholes, its connection with cable trenches, manhole with covers and existing surface drainage system as per Specifications and approved Drawing by Engineer	lot	1			
	1. 500kV Switchyard					
	2. 220kV Switchyard					
Total of Item No.4						
5	**Gravel Work**					
i.	Supply and placing of river run gravel 40 to 75mm size (in 200mm thick layer) including toe wall (if required) in switchyard area as specified and as directed by the Engineer.	cu.m	9000			
Total of Item No.5						
6	**Construction of Control House Building**					
i.	Design, Supply and construction of control house building. The scope of work includes but not limited to architectural (including false ceiling as per instruction of Engineer) & structural work, workshop drawings & calculations which includes relay room, control room, 11kv switchgear room, telecom & SCADA room, workshop battery room, prayer room, small kitchen, offices, wash rooms, sanitary, sewerage, water supply, electrification, granite glazed flooring, lightning protection, weather shield, wood work, steel/aluminum work, painting/polishing/white washing, fitting & fixtures, (with material including wire, 18" exhaust fan, 56" fans, bulbs, tube lights,	Job	1			

	switches, PVC conduits, sockets, call bell, DBs, butterfly shutter, bath fittings, utensils, wash basins, traps, almirahs, GI pipes, ladders, hangers and trays for cables,- provision and installation), RCC flooring for covered parking lot for at least 15 Vehicles, fire hydrant etc. complete in all aspects, ensuring compliance with the ECBC-2023 building code, ready to use as per specifications and drawings					
ii	Supply and construction of Generator Room as per Drawing No.PDW/TB-2469, 2470. The scope of work includes but not limited to architectural (including false ceiling as per instruction of Engineer) & structural work, workshop drawings & calculations complete in all aspects, ensuring compliance with the ECBC-2023 building code, ready to use as per specifications.	No.	1			
iii.	Design, Supply and Construction of Pad Mounted Transformer foundation complete in all aspects as per specification and drawing No. PDW/T/C-12(5)A	No.	2			
vi.	**Air Conditioning**					
	Design, supply, installation, testing and commissioning of DC invertor air conditioners (cooling/heating), units shall be of split unit type of Mitsubishi Japan Make/Equivalent for the all control house building rooms, mechanical building, relay room building and metering room except battery room, store, workshop, corridors and stair halls.					
	i. 1.5 Ton Units	No.	9			
	ii. 2 Ton Units	No.	10			
	iii. 4 Ton Units	No.	8			
Total of Item No.6						
7	**Compatibility/re-strengthening of Existing 220kV Gantries**					
	Compatibility/re-strengthening of Existing 220kV Gantries (Busbar I & II along with allied if any), for strain bus shall be analyzed through structural	Job	1			

	modeling along with design calculations and as per existing site conditions					
Total of Item No.7						
8	**Extra BOQ items**					
i)	Excavation to any type of soil by any means.	cu.m	500			
ii)	Providing and laying Lean Concrete 140kg/cm2, using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, molds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.)	cu.m	150			
iii)	Providing and laying RCC 210 kg/cm2, using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, molds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.)	cu.m	150			
iv).	Providing of deformed steel bars of ASTM A-615 Grade 60 for reinforced cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars)	Kg	2000			
v).	Providing and laying Fair Face plain brick work 229mm (9") thick in foundations, walls etc. as per drawings and specifications in 1:4 C.M	cu.m	125			
vi).	Providing and laying minimum 1/2" thick cement plaster in 1:4 C.M using ordinary Portland cement wherever required.	Sq.m	500			
vii).	P/F platform of 40x4 mm G.I. strip flat and bottom of G.I. tee iron 50x100x6mm fixing in position including the allied civil works complete in all respect as per Specifications and Drawing	No.	20			
Total of Item No.8						
Total (A) of Item No.1,2,3,4,5, 6,7 & 8						

B. 500/220kV Faisalabad West Grid Station						
S.No	**Description**	Unit	Qty.			
1	**2**	3	4			
	Earth work					
1.1	Clearing and grubbing of the complete site area for bushes, vegetation trees, roots and weeds etc. as per Drawings, Specifications and as directed by the Engineer including dismantling of old civil works if any, disposal of debris away from site to any lead.	Lot	1			
1.2	Filling, levelling and compaction of the built-up substation area with fill material to raise the level of the area in horizontal layers of 200 mm thickness (max) compacted up to 95% modified Proctor Density as per approved Contour Plan and Specifications and as directed by the Employer representative	-	-			
1.2.1	Using borrow fill material as per NGC Specification with compaction 95% proctor density with mechanical means with any lead and lift for raising (after clearing, grubbing of site, joint level survey will establish the backfilling quantity).	Cu.m	35,000			
1.2.2	BackFilling with Using material excavated from the other foundations on site or cutting material within the site with compaction 95% proctor density with mechanical means	Cu.m	10,000			
Total of Item No.1						
2	**500kV Equipment/Gantry Foundations**					
	Supply and Construction of Reinforced Cement Concrete work for Equipment's and Gantry foundations having minimum cylinder crushing strength of 210 kg/cm2 at 28 days using Sulphate Resistant Cement(SRC) conforming to ASTM C-150 inclusive of excavation / cutting, dewatering (if any), lean concrete/P.C.C/blinding layer, reinforcement (Grade 60), shuttering, concreting, curing, bitumen coating (min two coats) below ± 0 Level on all concrete surfaces, compacted backfilling, leveling/ grading, slope protection (where necessary), removal of surplus earth from site area as					

	directed by Engineer, installation of stubs / anchor bolts, capping & grouting under structure sole and in block-out etc.					
i.	500kV Post Insulator (PI) foundation as Per Drawing No. FWS-500-SUP-S7170-0111-AR (Rev-A) (Sheet 01 of 02)	No	28			
ii.	500kV Surge Arrestors as Per Drawing No. FWS-500-SUP-S7170-0111-AR (Rev-A)(Sheet 01 of 02)	No	6			
iii.	500kV CVT/CCVT/LT as Per Drawing No. FWS-500-SUP-S7170-0111-AR (Rev-A)(Sheet 01 of 02)	No	10			
iv.	500kV Disconnector Switch Bus/Line as Per Drawing No. FWS-500-SUP-S7170-0111-AR (Rev-A)(Sheet 02 of 02). One set means 6 isolated foundations as per referred drawing.	Set	8			
v.	500kV Single Pole Circuit breakers (CB) foundations as Per Drawing No. FWS-500-SUP-S7170-0111-AR (Rev-A)(Sheet 01 of 02). One set means 3 isolated foundations as per referred drawing.	Set	3			
vi.	500kV Current Transformer as Per Drawing No. FWS-500-SUP-S7170-0111-AR (Rev-A)(Sheet 01 of 02)	No	9			
vii.	500kV Gantry Foundation (C1) Type as Per Drawing No. FWS-000-SUP-S7170-0516-AR (Rev-A)	No	2			
viii.	500kV Gantry Foundation (C3) Type as Per Drawing No. FWS-000-SUP-S7170-0517-AR (Rev-A)	No	1			
ix.	500kV Gantry Foundation (C4) Type as Per Drawing No. FWS-000-SUP-S7170-0518-AR (Rev-A)	No	2			
x.	500kV Gantry Foundation (C5) Type as Per Drawing No. FWS-000-SUP-S7170-0519-AR (Rev-A)	No	2			
xi.	500kV Gantry Foundation (C3X) Type as Per Drawing No. FWS-000-SUP-S7170-0520-AR (Rev-A)	No	1			
xii.	500/220kV LCC Detail as per Drawing No. FWS-000-SUP-S7120-0221-NW (Rev-A) (Sheet 01 of 04)	No.	3			
Total of Item No.2						

3	**Switchyard Cable Trenches/Culverts/Moving Area/Surface Drainage:**					
3.1	Providing RCC cable trenches type I, 2, 3 and 4 inclusive excavation, dewatering, lean concrete (l40kg/cm2), Steel re-inforcement (grade-60), curing for specfic period, application of three coats of protective bitumen from sika or equivelent on face in contact with soil, compacted backfilling, removal of surplus material for Cable trenches, all types of crossings, slopes and attached kiosk, LCC, civil works for installation of tie channels embedded in walls at 2m interval, with Precast, Prestress RCC Covers and Hot Dip galvanised Steel Brackets etc. complete in all respects as per Drawings and Specifications [drawing No. FWS-000-SUP-S7120-0522-NW (05 Nos Sheets-Rev-A)] & [FWS-000-SUP-S7120-0631-AR (Rev-B)]					
i.	Cable Trench Type-1	Li.m	5			
ii.	Cable Trench Type-2	Li.m	10			
iii.	Cable Trench Type-3	Li.m	10			
iv.	Cable Trench Type-4	Li.m	10			
3.2	Supply and Construction of cable trench crossing under transformer way and switchyard path complete in all aspects as per specification and [drawing No. FWS-000-SUP-S7120-0522-NW (05 Nos Sheets-Rev-A)]					
i.	Culvert for Trench Type-1	Li.m	5			
ii.	Culvert for Trench Type-2	Li.m	5			
iii.	Culvert for Trench Type-3	Li.m	5			
3.3	Construction of RCC Walkways/ service roads for maintenance of equipments in switch yards including excavation, leveling, kerb stone eding, compection , backfilling ,reinforcement grade 60, PCC 140 KG/Cm2 ,RCC 210 KG/cm2, subgrade gravel,expension jionts and theire sealings with sealent material etc. as per drawing and specification.					
	4m	Li.m	500			
	2.5m	Li.m	60			
3.4	Supply and installation of PVC conduit approved by Engineer for carrying miscellaneous cables from cable trenches to equipment as specified.					

i.	50mm (2inch) dia along with accessories (i.e bends, joints)	Li.m	75			
ii.	100mm (4inch) dia along with accessories (i.e bends, joints)	Li.m	75			
iii.	150mm (6inch) dia along with accessories (i.e bends, joints)	Li.m	75			
3.5	Construction of switchyard surface water / rain / storm water drainage and cable trenches water drainage system, road crossings its disposal system, draw pits / soakage pits with its efficient disposal system having pumping arrangements (pump having minimum power 2HP and PVC/UPVC pipe line minimum dia 225mm (9 inch) with proper jointing and its testing after filling the line with water for 24 hrs and noting leakage if any and accordingly make the improvement) to dispose water from switchyard to switchyard outside area approved by the Engineer complete in all respects including PVC/UPVC pipes with manholes, its connection with cable trenches, manhole with covers, as per Specifications and approved Drawing by Engineer					
i.	500kV Line Bays (To be connected with existing drainage system)	Lot	1			
Total of Item No.3						
4	**Gravel Work**					
i.	Supply and placing of river run gravel 40 to 75mm size (in 200mm thick layer) including toe wall (if required) in switchyard area as specified and as directed by the Engineer.	cu.m	1800			
Total of Item No.4						
5	**Extra BOQ items**					
i)	Excavation to any type of soil by any means.	cu.m	50			
ii)	Providing and laying Lean Concrete 140kg/cm^2, using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, molds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel	cu.m	25			

	reinforcement, its fabrication and placing in position, etc.)					
iii)	Providing and laying RCC 210 kg/cm^2, using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, molds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.)	cu.m	25			
iv).	Providing of deformed steel bars of ASTM A-615 Grade 60 for reinforced cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars)	Kg	350			
v).	Providing and laying Fair Face plain brick work 229mm (9") thick in foundations, walls etc. s per drawings ans specifications in 1:4 C.M	cu.m	30			
vi).	Providing and laying minimum 1/2" thick cement plaster in 1:4 C.M using ordinary Portland cement wherever required.	Sq.m	100			
vii).	P/F platform of 40x4 mm G.I. strip flat and bottom of G.I. angle iron 50x100x6mm fixing in position including the allied civil works complete in all respect as per Specifications and Drawing	No.	20			
Total of Item No.5						
Total (B) of Item No.1,2,3,4,5						
Grand Total [Total (A)+Total (B)]						
Grand Total [Total (A)+Total (B)] Column 6 to carried forward to Grand summary						

Notes:

1	The quantities mentioned in the BOQ are estimated quantities. The actual quantities may vary depending upon detailed engineering and approved drawings. However, the unit rates for material and service quoted in the BOQ/ bid shall remain firm and final.

2	The drawings mentioned in BOQ are provided solely for estimation and tender purpose. Foundation design is subject to change based on actual site conditions. The contractor is required to visit the site and asses the design independently. No variation will be entertained at the later stage. The offered unit rates shall be adjusted as per actual civil work quantities based on relevant BOQ items (Break up is to be provided by bidder)/extra BOQ items whichever is minimum.
3	The breakup of unit rates for each item/ works quoted in the BOQ shall be provided with the bid in accordance with the design drawings provided with the tender and the work at site shall be executed as per construction drawings provided/ approved by the Engineer.
4	Switchyard trenches shall be provided with gradual slope for proper disposal/ drainage of rain water keeping in view the safety of other equipment in the Switchyard. Switchyard paths/ roads shall be provided keeping in view the slope/ level of switchyard, future extension and movement of cranes and its clearance from equipment/ live parts.
5	Switchyard area shall be designed in appropriate levels if applicable as per contour plan and ±zero level to be provided by NGC to minimize cutting and filling with proper provision of rain water drainage.
6	Any other item deemed necessary by the bidder for the successful completion and smooth operation of the project and not quoted above may also be quoted separately and mentioned herewith prior to the Bid submission.
7	Any item/ sub-item and its quantity not mentioned above or not quoted separately by the bidder in his bid, shall not be paid after the award of the Contract to the successful bidder.
8	In case of discrepancy between unit price and total price, unit price shall prevail and the payment will be made accordingly.
9	The cost quoted for above Works shall include cost of labor and cost of all accessories/ material/ equipment required for successful completion and operation.
10	This BOQ has been based on drawing provided by DG (Substation Engineering) NGC. Any change in switchyard layout plan would result in change of scope as given above.

[1]*Specify currency in accordance with ITB 12.*

Name of Bidder _____

Signature of Bidder _____

(b) Installation/ Erection, Testing &Commissioning

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
I	**500/220kV Ludewala Grid Station**					
A	**Transformers**					
1.	**525/√3/231/√3/23 kV Auto Transformer Bank**					
1.1.	525/√3/231/√3/23 kV, 250x3 MVA, Auto-Transformer Bank, complete with indoor & outdoor control cubicles, Marshaling Kiosk, bushings having extended creepage distance(31mm/kV), terminal connectors, MR Germany or equivalent make OLTC, Surge Arrestors for Tertiary winding, out of delta CT for tertiary winding, Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA and all other equipment and accessories as specified.	Set	2			
1.2	525//3/231//3/23 kV, 250 MVA, Spare Auto-Transformer Unit complete with outdoor control cubicles, bushings having extended creepage distance(31mm/kV), terminal connectors, MR Germany or equivalent make OLTC, Surge Arrestors for Tertiary winding, Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA and all other equipment and accessories as specified.	No.	1			
1.3	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for transformer bank, complete with all equipment and accessories as specified and with separate OGST for each transformer unit	Set	2			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	(i.e 3 Nos. OGST for each Transformer Bank).					
1.4	Insulated bus bar (DURESCA make or equivalent) 4000A, 52kV for interconnection of tertiary bushings to form delta connection of tertiary windings of each auto-transformer bank, as specified, including steel protection box (for enclosing the tertiary bushings & surge arresters for tertiary windings) and all the accessories, attachments, fittings, fastenings, connectors, conductors, hardware, earthing materials etc. as required to complete the tertiary windings interconnections and surge arresters installation in all respects.	Set	2			
1.5	Neutral bus bar complete arrangement including but not limited to aluminum tubular conductor, post insulators with structures, all type of connectors etc. for **Auto Transformer Bank**.	Set	2			
	Sub Total of Item A	-	**-**	**-**	**-**	
B.	**550/√3kV Shunt Reactor Bank**					
1.	550/√3 kV,3x37 MVAR (at 500 kV) Shunt reactor Banks complete with local control cubicles, bushings having extended creepage distance(31mm/kV), Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA, terminal connectors and all other equipment and accessories as specified.	Sets	5			
2.	550/√3 kV,37 MVAR (at 500 kV) Single Phase Spare Shunt reactor unit with local control cubicles, bushings having extended creepage distance(31mm/kV), Online Condition Monitoring System with two fault gases (H2 and CO) & moisture (2+1) Online DGA, terminal connectors and all other equipment and accessories as specified.	No.	3			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
3.	Marshaling Kiosks for Shunt Reactor banks.	No.	5			
4.	Neutral bus bar complete arrangement including but not limited to aluminum tubular conductor, post insulators with structures, all type of connectors etc. for two Shunt Reactor Banks and one spare unit.	Lot	5			
5.	Indoor auxiliary control Panel for shunt reactor banks with allied accessories.	No.	5			
6.	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for Shunt Reactor bank, complete with all accessories as specified and with separate OGST for each Shunt Reactor unit (i.e 3 Nos. OGST for each Shunt Reactor Bank).	Set	5			
7.	Nitrogen injection explosion prevention and fire protection system (Sergi France or equivalent) for Shunt Reactor single unit, complete with all accessories as specified and with separate OGST.	No.	3			
8.	Bank Selector Kiosk	No.	3			
9.	Any other equipment/material required to make shunt reactor banks, transfer bus and firefighting system operational.	Lot	1			
	Sub Total of Item B	-	-			
C.	**500kV Switch Yard Equipment**					
1.	Circuit Breaker SF6 Gas type, three pole, 550kV 3150A, 50kA 1 sec, with pre-insertion resistors, grading capacitor, busing having extended creepage distance(31mm/kV), 220V DC operating mechanism with local control cubicle, terminal connectors, steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.	Set	16			
2.	Bus Disconnector (without earthing switch), three pole, 550 kV, 3150 A, 50 kA 1 sec, M2	Set	29			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.					
3.	Line Disconnectors (with earthing switch), three pole, 550 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	5			
4.	550 kV, 50kA(1-sec), single pole, 3000-2500:2000:1250:750/1A ratio, 5 core Current Transformers, cores having tapping (VA burdens 15,30,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance(31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.	No.	33			
5.	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box (1 for each set of 3 No. CVTs), steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	18			
6.	Coupling Capacitor voltage transformer (CCVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended	No.	10			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	creepage distance(31mm/kV), terminal connectors, with carrier coupling accessories, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.					
7.	Surge Arrestors 444 kV, 50kA, Single Pole with bushings having extended creepage distance(31mm/kV), terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.	No.	39			
8	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied accessories as per IEC 60273 & IEC 60168 and all other allied equipment & accessories as specified.	No.	116			
	Sub Total Item C	-	-			
D.	**500kV High Voltage Bus Work**					
1.	**String Assemblies**					
1.1	500 kV Double Tension String Assembly for 3×810mm^2 and 4×810mm^{2}Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, Extension/Jumper terminal, 160kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.					
	with turn buckle	Lot	1			
	without turn buckle	Lot	1			
1.2	500 kV Double Suspension String Assembly (V Type) for 3×810mm^2 and 4×810mm^2 Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, 160 kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
2.	**Overhead Flexible Conductors**					
2.1	810 mm^2 Coreopsis Conductor as specified.	Lot	1			
3.	**Aluminum Tubular Conductor**					
3.1	Aluminum tubular conductor for connection between switchyard equipment as specified.	Lot	1			
4.	**Connectors, Hardware & Accessories**					
4.1	For 810 mm^2 Coreopsis Conductor as specified.	Lot	1			
4.2	For Aluminum tubular conductor of connection between switchyard equipment as specified.	Lot	1			
5.	**Steel Structure support 500kV Overhead Busses**					
5.1	**Beams**					
5.1.1	32m, Type V1 (Triple Coreopsis Conductor)	No.	5			
5.1.2	32m, Type V2 (Triple Coreopsis Conductor)	No.	15			
5.1.3	32m, Type V2X (Triple Coreopsis Conductor)	No.	5			
5.1.4	33m, Type V3G (Quad Coreopsis Conductor)	No.	16			
5.2	**Column**					
5.2.1	(30.75+9.25)m, Type C1(Triple Coreopsis Conductor)	No.	6			
5.2.2	(20+10.75+9.25)m, Type C3 (Quad Coreopsis Conductor)	No.	12			
5.2.3	(20+10.75+9.25)m, Type C3X (Quad Coreopsis Conductor)	No.	06			
5.2.4	20m, Type C4 (Quad Coreopsis Conductor)	No.	11			
5.2.5	(20+10.75+9.25)m, Type C5 (Triple Coreopsis Conductor)	No.	06			
5.2.6	18 m, (for Shunt Reactor transfer Bus Support)	No.	04			
	Sub Total Item D	-	-			
E	**Protection & Control**					
1.	Site activities including: • Laying of cables (Power & Control) i.e. Wiring, Cabling, terminations, Interconnections, testing etc. from Primary Switchyard equipment (i.e. CT/PT Marshalling Boxes, Transformers LCCs/ACP/Motor drive	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	units/OLTC and Circuit Breakers, isolators/earth switches Local Control Cubicles LCCs) etc., to Secondary equipment/panels/system (Protection, Control, LCCs, Automation, Monitoring, Recording, New AC/DC Auxiliary Services system for 500/220 kV system, AC/DC Auxiliary Sub-distribution Panels for 220 kV system and Auto-Transformer AVR panel, Telecom equipment, Gateways & servers etc.) • Laying of cables i.e. Wiring, Cabling, terminations, Interconnections, testing etc. between Secondary equipment/panels/system (Protection, Control, LCCs, Automation, Monitoring, Recording, New AC/DC Auxiliary Services system for 500/220 kV system, AC/DC Auxiliary Sub-distribution Panels for 220 kV system and Auto-Transformer AVR panel., etc. • Installation, Erection, Interfacing/Interconnections, Testing, & Commissioning of all Secondary i.e. Protection, Control, SAS, Monitoring, Recording, AC/DC Auxiliary Services /panels along with their schemes including but not limited to BCU Control Panels, Local Control Cubicles, Protection Panels, sync panels, Common BCU Panels, FO Patch/Routing Panels, Station level interfacing panels, GPS equipment, SAS system/equipment, Event & Fault Recorder Panels, AC/DC Auxiliary Supply Panels, Inverter panel, battery charger, AC/DC Auxiliary Sub-distribution					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	Panel for 500/220 kV system, Diesel Generator, Standalone / Parallel operation of 500/220kV Auto-transformers & all related protection, control & automation schemes up-to switchyard primary equipment (i.e. Power transformer, Auto transformer, CTs, PTs, Circuit Breaker, Isolator, Earth Switch etc.) according to NGC Specifications & standard practices. • Interconnection, testing & commissioning of protection, control, Substation Automation System(SAS), metering and recording system and AC/DC Auxiliary for 500/220kV system, AC/DC Auxiliary Sub-distribution Panel for 220 kV system & their schemes with switchyard equipment according to NGC specifications and technical provisions. • Interfacing/modification, testing & commissioning of P&C ENGINEERING scheme for relevant new & existing 220 kV Protection, Control & Allied Panels, while incorporating modifications made according to interfacing of new 220 kV with existing 220 kV system including but not limited to existing Busbar protection, Breaker Failure Protection Schemes, Common Alarm, AC & DC auxiliary supply schemes and any other allied scheme which needs to be modified due to addition of these 02 Nos. of Auto transformers for their proper, accurate and discriminate operation. • It is clarified that any scheme modification in					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	existing 220 kV system (i.e., cable schedule / interconnection, laying, wiring, termination etc.) from existing Relay / Control Rooms to Local Control Cubicle(s) and then from existing Local Control Cubicle(s) to Primary Equipment Marshalling Boxes i.e., Circuit Breakers Marshalling Box, Isolators Marshalling Box, Earth Switches Marshalling Box, CT Marshalling Boxes, CCVT Marshalling Boxes etc., is also included in the scope of work. • Fault recorder Interfacing, testing & commissioning for complete scope of work.					
2.	Laying, splicing, connections, interconnections, testing etc., of Fiber Optic (FO) shielded single or multi core cables along with allied accessories & any other FO cables etc. for laying, splicing, connections, interconnections, testing etc. to successfully establish Substation Automation system as per approved SAS concept diagram / scheme requirements in order to make SAS functional.	Lot	1			
3.	Setting, Configuration & Testing of each Protection, Control, Substation Automation System(SAS), Monitoring & Recording related equipment/IEDs and allied schemes	Lot	1			
4.	**SAS / SCADA Equipment and Services Related to Telecom**					
4.1	Installation and erection of the complete Gateway system at 500 kV G/S Ludewala, as per the approved BOQ, including all necessary mounting, cabling, wiring, termination, earthing and associated installation works. The Contractor shall carry out complete configuration, testing and commissioning of the Gateway	Set	1 set (2 Gateway server with firewall & 2 Cubicles			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	system and configure the Gateway database as per the approved I/O Signal List, complete in all respects.					
4.2	The Contractor shall carry out complete local and end-to-end testing of all approved SCADA signals from 500 kV G/S Ludewala up to the designated ISMO interfaces at NPCC Islamabad and BCC Jamshoro through the NGC Telecom Network under actual field conditions. The scope shall include verification of signal acquisition, processing, mapping, transmission, communication, indication and successful receipt of all signals at the designated control centers, in coordination with the relevant NGC Field Operations, NGC Telecom Engineering, P&C Engineering and ISMO.	Lot	1			
5.	**Metering Panel**					
5.1	Metering panel 4-Line (without AC Power Transducers and paperless recorder) with four(4) Energy meters (accuracy class 0.2S) for 500kV Auto Transformer Bank & T/Line metering.	No.	2			
	Sub Total Item E	-				
F.	**AC & DC Auxiliary Supply System for 500kV Equipment**					
1.	415/230 V AC-I & II Auxiliary Supply Panels with both automatic and manual changeover facility utilizing 02 415/230 V AC Sources and 01 Diesel Generator Set.	Set	1			
2.	220 V DC-I & II Auxiliary Supply Panels with both manual and automatic changeover facility for 500kV System along-with DC emergency busbar-I & II.	Set	1			
3.	Lead acid battery bank, 220V, 600AH(minimum) complete with accessories as specified.	No.	2			
4.	Automatic static battery charger 220V, 100A(minimum) complete with accessories as	No.	2			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	specified.					
	Sub Total Item F	-				
G.	**Telecommunication Equipment**					
1	Erection, installation, testing and commissioning of complete new DPLC system at 500 kV G/S Ludewala, including indoor DPLC equipment, line traps, LMUs, HF/coaxial cables, associated cabling, earthing, accessories and all other indoor/outdoor equipment required for establishment of complete DPLC communication links with the respective remote ends, as per BOQ, complete in all respects.	Lot	01			
2	Installation, erection, testing and commissioning of new PAX system at 500 kV G/S Ludewala as per BOQ requirements, including all associated equipment, cabling, configuration, programming and accessories, and integration with the PAX systems at the respective remote ends through the specified DPLC and OLTE transmission channels, complete in all respects.	Lot	01			
3	Installation, erection, testing and commissioning of complete new 48V DC Power Supply System at 500 kV G/S Ludewala as per BOQ requirements, including battery bank, battery chargers in 1+1 configuration, DC distribution system, protection, monitoring, associated cabling, accessories and all other ancillary equipment required for a complete and functional system.	Lot	01			
4	Erection, installation, testing and commissioning of the complete new indoor and outdoor Optical Fiber Communication System at 500 kV G/S Ludewala as per BOQ requirements, including OLTE (SDH/PDH), ODF/DDF, armored FOAC, OPGW interfacing, fiber termination, splicing, patch cords, pigtails, optical modules, associated cabling, accessories and establishment of complete end-	Lot	01			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	to-end optical communication links with the respective remote ends, complete in all respects.					
5	Installation, erection, testing and commissioning of the complete Cooling System at 500 kV G/S Ludewala, including all air-conditioning units, automatic duty/standby changeover and time-control arrangement, associated control equipment, cabling, piping, accessories and all ancillary works required for reliable and continuous operation of the Telecom equipment, as per BOQ requirements, complete in all respects.	Lot	01			
	Sub Total Item G	-				
H.	**220kV Switch Yard Equipment**					
1	Circuit Breaker SF6 Gas type, three pole, 245kV 3150A, 50kA 1 sec, 220V DC motor mechanism with local control cubicle, bushings having extended creepage distance(31mm/kV), terminal connectors along with steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.	Set	04			
2.	Bus Isolators(without earthing switch), three pole, 245 kV, 3150 A, 50 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	10			
4.	245 kV, 50kA(1-sec), single pole, 3000:2400:1200:600/1A ratio, 5 core Current Transformers, cores having tapping (VA burdens 15,60,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or	No.	12			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	parallel connection adjustment on primary side), with bushings having extended creepage distance (31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.					
5.	Capacitor voltage transformer (CVTs), 245 kV, Single pole, 2 core, 220/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	02			
6.	Surge Arrestors 198 kV, 50kA, with bushings having extended creepage distance, terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.	No.	06			
7.	245kV Post Insulator stacks, IEC type designation C10-1050 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied equipment & accessories as specified as per IEC 60273 & IEC 60168.	No.	33			
	Sub Total Item H	-				
I.	**245kV High Voltage Bus Work**					
1.	**String Assemblies**					
1.1	220 kV Double Tension String Assembly for 2×810mm^2 and 3×810mm^2 Al. Alloy conductor (Coreopsis) with Arcing Horn, Extension/Jumper Terminal, 160 kN (fog type) Disc insulators (18 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.(This also					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	includes the String Assemblies to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).					
	With turnbuckle	Lot	1			
	Without turnbuckle	Lot	1			
1.2	220 kV Double Suspension String assembly for 2×810mm2 and 3×810mm^2 Al. Alloy conductor (Coreopsis) with Arcing Horn, 160 kN (fog type) Disc insulators (18 x 2 Nos.) etc. complete with hardware and allied accessories (This also includes the String Assemblies to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).	Lot	1			
3.	**Overhead Flexible Conductors**					
3.1	810 mm^2 Coreopsis Conductor as specified (This also includes the conductor to replace the existing double conductor bus bar with 3×810mm2 Al. Alloy conductor (Coreopsis)).	Lot	1			
4.	**Aluminum Tubular Conductor**					
4.1	Aluminum tubular conductor for connection between switchyard equipment.	Lot	1			
5.	**Connectors, Hardware & Accessories**					
5.1	For 810 mm^2 Coreopsis Conductor as specified.	Lot	1			
5.2	For the connection of existing switchyard equipment with upgraded Bus Bar of 3×810mm2 Al. Alloy conductor (Coreopsis) as specified.	Lot	1			
5.3	For Aluminum tubular conductor for connection between switchyard equipment as specified.	Lot	1			
6.	**Steel Structure support 245kV Overhead Busses**					
6.1	**Beams**					
6.1.1	Length 16m (Triple Coreopsis Conductor)	No.	08			
6.1.2	Length 16m (Double Coreopsis Conductor)	No.	07			
6.2	**Column**					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
6.2.1	18.5+4m (Double Coreopsis Conductor)	No.	10			
6.2.2	13m (Triple Coreopsis Conductor)	No.	16			
	Sub Total Item I	-				
J.	**AC & DC Auxiliary Supply System for 220kV Equipment**					
1.	Addition/Modification/Adoption of existing 415/230 V AC Auxiliary Supply Panels.	Lot	1			
2.	Addition/Modification/Adoption of existing 220V DC Auxiliary Supply Panels.	Lot	1			
3.	Lead acid battery bank, 220V, 600AH(minimum) complete with accessories as specified to replace the existing 220V battery bank for 220kV Switchyard.	No.	2			
4.	Automatic static battery charger 220V, 100A (minimum) complete with accessories as specified to replace the existing battery chargers for existing 220kV switchyard.	No.	2			
	Sub Total Item J	-				
K	**11kV Equipment**					
1.	11.5/ 0.415 kV, 630kVA Pad Mounted Transformer (Alternate-III) along with all allied equipment and accessories as specified.	No.	2			
2.	11kV Metalclad Indoor type Switchgear outgoing Panels along with all allied equipment and accessories as specified.	No.	2			
3.	3-Core XLPE Power Cable 15,000 Volts, 4/0AWG including termination kits and accessories as specified.(for connection of 11.5/0.415kV Pad mounted transformer with Outgoing Panels)	Lot	1			
	Sub Total Item K	**-**	**-**	**-**		
L.	**Substation General Equipment**					
1.	**Substation Grounding System for 500kV, 220kV Switchyard and Buildings.**					
	Grounding System for entire Substation (for 50kA, 1 sec),					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	indoor / outdoor equipment, control house building, control / relay room, generator room switchyard door / fence etc.					
1.1	Copper conductor 185mm^2(minimum).	Lot	1			
1.2	Earthing Rod 3 m(minimum) long as specified.	Lot	1			
1.3	Cartridges and Moulds with holding clamp.	Lot	1			
1.4	Grounding Connectors	Lot	1			
2.	**Overhead Shieldwire for 500kV & 220kV switchyard.**					
2.1	9 mm (7/3.0 mm) dia Galvanized Steel wire as specified.	Lot	1			
2.2	Assembly for 9 mm Earth wire fitting complete with all accessories as specified.	Lot	1			
3.	**Cables and Accessories.**					
3.1	Control and small power cables with all accessories	Lot	1			
3.2	Cable trays, racks, supports, cable conduits etc.	Lot	1			
4.	**Diesel Generator** 625 kVA, 415 V Standby Diesel Generator along with automatic changeover switch and all other equipment and accessories as specified.	No.	1			
5.	Out Door switchyard Lighting System as specified.	Lot	1			
6.	Mobile fire extinguisher for switchyard area.	No.	60			
7.	Fire extinguisher for control and relay buildings(wall mounted)	No.	20			
	Sub Total Item L	-	-	-		
	Sub Total of Item I (Item A to L)	-	-	-		
II	**Extension Works at 500/220/132kV Faisalabad West Grid Station**					
A	**500kV Switch Yard Equipment**					
1.	Circuit Breaker SF6 Gas type, three pole, 550kV 3150A, 63kA 1 sec, with pre-insertion resistors, grading capacitor,	Set	3			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	busing having extended creepage distance(31mm/kV), 220V DC operating mechanism with local control cubicle, terminal connectors, steel supporting structures, anchor bolts and all other equipment and allied accessories as specified.					
2.	Bus Disconnector (without earthing switch), three pole, 550 kV, 3150 A, 63 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	6			
3.	Line Disconnectors (with earthing switch), three pole, 550 kV, 3150 A, 63 kA 1 sec, M2 type, busing having extended creepage distance(31mm/kV), 220V DC motor operated with local control cubicle, terminal connectors, earthing mat, steel supporting structure, anchor bolt and all other equipment and allied accessories as specified.	Set	2			
4.	550 kV, 63kA(1-sec), single pole, 3000-2500:2000:1250 /1A ratio, 6 core Current Transformers, cores having tapping (VA burdens 15,30,30,30,30,30 at lowest tap) at secondary side (i.e. adjustable ratio from secondary side, no series or parallel connection adjustment on primary side), with bushings having extended creepage distance(31mm/kV), complete with marshalling box (1 for each set of 3 No. CTs) , anchor bolts, nuts & washers, steel supporting structure and all other allied accessories as specified.	No.	9			
5.	Capacitor voltage transformer (CVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended	No.	2			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	creepage distance(31mm/kV), terminal connectors, marshaling box (1 for each set of 3 No. CVTs), steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.					
6.	Coupling Capacitor voltage transformer (CCVTs), 550 kV, Single pole, 2 core, 500/√3kV / 110/√3V / 110/√3V voltage ratio with bushings having extended creepage distance(31mm/kV), terminal connectors, with carrier coupling accessories, marshaling box, steel supporting structure, anchor bolts, etc and all other allied equipment & accessories as specified.	No.	4			
7.	Surge Arrestors 444 kV, 63kA, Single Pole with bushings having extended creepage distance(31mm/kV), terminal connectors, Grading Ring, surge counters/ monitor, steel supporting structure, anchor bolts etc and all other allied equipment & accessories as specified.	No.	6			
8.	550kV Post Insulator stacks, IEC type designation C10-1800 with bushings having extended creepage distance along with steel supporting structures, anchor bolts and all other allied accessories as per IEC 60273 & IEC 60168 and all other allied equipment & accessories as specified.	**No.**	**28**			
	Sub Total Item A	-	-	-		
B.	**500kV High Voltage Bus Work**					
1.	**<u>String Assemblies</u>**					
1.1	500 kV Double Tension String Assembly for 3×810mm^2 and 4×810mm^{2}Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, Extension/Jumper terminal, 160kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	allied accessories as per tender specifications.					
	with turn buckle	Lot	1			
	without turn buckle	Lot	1			
1.2	500 kV Double Suspension String Assembly (V Type) for 3×810mm^2 and 4×810mm^2 Al. Alloy conductor (Coreopsis) with Corona Ring, Arcing Horn, 160 kN (fog type) Disc insulators (40 x 2 Nos.) etc. complete with hardware and allied accessories as per tender specifications.	Lot	1			
2.	**Overhead Flexible Conductors**					
2.1	810 mm^2 Coreopsis Conductor as specified.	Lot	1			
3.	**Aluminum Tubular Conductor**					
3.1	Aluminum tubular conductor for connection between switchyard equipment as specified.	Lot	1			
4.	**Connectors, Hardware & Accessories**					
4.1	For 810 mm^2 Coreopsis Conductor as specified.	Lot	1			
4.2	For Aluminum tubular conductor of connection between switchyard equipment as specified.	Lot	1			
5.	**Steel Structure support 500kV Overhead Busses**					
5.1	**Beams**					
5.1.1	32m (Triple Coreopsis Conductor) V1	No.	2			
5.1.2	32m (Triple Coreopsis Conductor) V2	**No.**	**3**			
5.1.3	32m (Triple Coreopsis Conductor) V2X	No.	1			
5.1.4	33m (Quad Coreopsis Conductor) V3G	No.	2			
5.2	**Column**					
5.2.1	(30.75+9.25)m Type C1(Triple Coreopsis Conductor)	No.	2			
5.2.2	(20+10.75+9.25)m Type C3 (Quad Coreopsis Conductor)	No.	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
5.2.3	(20+10.75+9.25)m Type C3X (Quad Coreopsis Conductor)	No.	1			
5.2.4	20m Type C4 (Quad Coreopsis Conductor)	No.	2			
5.2.5	(20+10.75+9.25)m Type C5 (Triple Coreopsis Conductor)	No.	2			
	Sub Total Item B	-				
C	**Protection & Control**					
1.	i. Site activities including: • Laying of cables (Power & Control) i.e. Wiring, Cabling, terminations, Interconnections, testing etc. from Primary Switchyard equipment (i.e. CT/PT Marshalling Boxes, Transformers LCCs/ACP/Motor drive units/OLTC and Circuit Breakers, isolators/earth switches Local Control Cubicles LCCs) to Secondary equipment/panels/system (Protection, Control, LCCs, Automation, Monitoring, Recording, New AC/DC Auxiliary Services system for 500 kV system, AC/DC Auxiliary Sub-distribution Panels for 220 kV system and Auto-Transformer AVR panel, Telecom equipment, Gateways & servers etc.) • Laying of cables i.e. Wiring, Cabling, terminations, Interconnections, testing etc. between Secondary equipment/panels/system (Protection, Control, LCCs, Automation, Monitoring, Recording, New AC/DC Auxiliary Services system for 500 kV system, AC/DC Auxiliary Sub-distribution Panels for 220 kV system	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	and Auto-Transformer AVR panel., etc • Installation, Erection, Interfacing/Interconnections, Integration of (existing SAS with extension work) Testing, & Commissioning of all Secondary i.e. Protection, Control, SAS, Monitoring, Recording, AC/DC Auxiliary Services /panels along with their schemes including but not limited to BCU Control Panels, Local Control Cubicles, Protection Panels, sync panels, Common BCU Panels, FO Patch/Routing Panels, Station level interfacing panels, GPS equipment, SAS system/equipment, Event & Fault Recorder Panels, AC/DC Auxiliary Supply Panels, Inverter panel, battery charger, AC/DC Auxiliary Sub-distribution Panel for 500 kV system, Diesel Generator, Standalone / Parallel operation of 500/220kV Auto-transformers & all related protection, control & automation schemes up-to switchyard primary equipment (i.e. Power transformer, Auto transformer, CTs, PTs, Circuit Breaker, Isolator, Earth Switch etc.) according to NGC Specifications & standard practices. • Interconnection, Integration (of existing SAS with extension scope of work), testing & commissioning of protection, control, automation, metering and recording system and AC/DC Auxiliary for 500kV system, AC/DC Auxiliary					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	Sub-distribution Panel for 220 kV system & their schemes with switchyard equipment according to NGC specifications and technical provisions. • It is clarified that any scheme modification in existing 500 kV system (i.e., cable schedule/interconnection, laying, wiring, termination etc.) from existing Relay / Control Rooms to Local Control Cubicle(s) and then from existing Local Control Cubicle(s) to Primary Equipment Marshalling Boxes i.e., Circuit Breakers Marshalling Box, Isolators Marshalling Box, Earth Switches Marshalling Box, CT Marshalling Boxes, CCVT Marshalling Boxes etc., is also included in the scope of work. • Fault recorder Interfacing, testing & commissioning for the subject and future scope of work.					
2.	Laying, splicing, connections, interconnections, testing etc. of Fiber Optic (FO) shielded single or multi-core cables along with allied accessories & any other FO cables, etc. for laying, splicing, connections, interconnections, testing, etc. to successfully **establish Substation Automation system as per approved SAS concept diagram/scheme** requirements to make SAS functional.	Lot	1			
3.	Setting, Configuration & Testing of each Protection, Control, Automation, Monitoring & Recording related equipment/IEDs and allied schemes	Lot	I			
4.	**SAS / SCADA Equipment and Services Related to Telecom**					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
4.1	Modification, expansion and reconfiguration of the existing commissioned Gateway system at 500 kV G/S Faisalabad West for incorporation of the additional SCADA signals from two (02) new bays, including provision and installation of the required additional Gateway interface modules/cards, hardware, software, associated cabling, wiring, termination and accessories, as per the approved BOQ. The Contractor shall carry out complete configuration, testing and commissioning of the modified/expanded Gateway system and reconfigure the Gateway database as per the approved I/O Signal List, complete in all respects.	Lot	1			
4.2	The Contractor shall carry out complete local and end-to-end testing of the additional SCADA signals from two (02) new bays at 500 kV G/S Faisalabad West up to the designated ISMO interfaces at NPCC Islamabad and BCC Jamshoro through the NGC Telecom Network under actual field conditions. The scope shall include verification of signal acquisition, processing, mapping, transmission, communication, indication and successful receipt of all additional signals at the designated control centers, in coordination with the relevant NGC Field Operations, NGC Telecom Engineering, P&C Engineering and ISMO.	Lot	1			
5.	**Metering Panel**					
5.1	Metering panel 4-Line (without AC Power Transducers and paperless recorder) with two(2) Energy meters (accuracy class 0.2S) for 500kV Line metering.	No.	1			
	Sub Total Item C	-				
D.	**AC & DC Auxiliary Supply System for 500kV Equipment**					
1.	Addition/Modification/Adoption of existing 415/230 V AC Auxiliary Supply Panels.	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
2.	Addition/Modification/Adoption of existing 220V DC Auxiliary Supply Panels.	Lot	1			
	Sub Total Item D	-				
E	**Telecom Equipment**					
1.	Erection, installation, testing and commissioning of complete new DPLC system at 500 kV G/S Faisalabad West, including indoor DPLC equipment, line traps, LMUs, HF/coaxial cables, associated cabling, earthing, accessories and all other indoor/outdoor equipment required for establishment of complete DPLC communication links with 500 kV G/S Ludewala, as per BOQ, complete in all respects.	Lot	1			
2.	Modification, expansion, configuration, integration and re-commissioning of the existing PAX system at 500 kV G/S Faisalabad West, including provision, installation and configuration of the required additional cards/modules, associated hardware/software, cabling, programming and accessories, and integration with the PAX systems at the respective remote ends through the specified DPLC and OLTE transmission channels, complete in all respects.	Lot	1			
3.	Installation, testing and commissioning of all necessary DC power supply arrangements at 500 kV G/S Faisalabad West for supplying the new Telecom equipment under this Contract from the existing 48V DC Power Supply System, including required modifications, additions, DC distribution circuits, protection, cabling, terminations, accessories and all associated works required for complete and reliable operation as per BOQ requirements.	Lot	1			
4.	Installation, testing and commissioning of the required additional interface	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	cards/modules, optical transceivers, ODF/DDF arrangements, armored FOAC, fiber termination, splicing, patch cords, pigtails, associated cabling, accessories and all necessary modifications required for integration of the existing SDH/PDH system at 500 kV G/S Faisalabad West with 500 kV G/S Ludewala and the respective remote ends, complete in all respects					
	Subtotal of E					
F.	**Substation General Equipment**					
1.	**Substation Grounding System for 500kV Switchyard and Building.**					
	Grounding System for Extended Portion of Substation(for 63kA, 1 sec), indoor / outdoor equipment, control house building, control / relay room, switchyard door / fence etc.					
1.1	Copper conductor 185mm^2 (minimum).	Lot	1			
1.2	Earthing Rod 3 m long as specified.	Lot	1			
1.3	Cartridges and Moulds with holding clamp.	Lot	1			
1.4	Grounding Connectors	Lot	1			
2.	**Overhead Shieldwire for Extended portion of 500kV Switchyard.**					
2.1	9 mm (7/3.0 mm) dia Galvanized Steel wire as specified.	Lot	1			
2.2	Assembly for 9 mm Earth wire fitting complete with all accessories as specified.	Lot	1			
3.	**Cables and Accessories.**					
3.1	Control and small power cables with all accessories	Lot	1			
3.2	Cable trays, racks, supports, cable conduits etc.	Lot	1			
4.	Out Door switchyard Lighting System for extended portion of 500kV switchyard as specified.	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
5.	Mobile fire extinguisher for switchyard area.	No.	8			
	Sub Total of Item F					
G	**ENVIRONMENTAL AND SOCIAL SAFEGUARDS FOR Upgradation of the 220 kV Ludewala Grid Station into 500 kV and the extension of two (02) line bays at 500 kV Faisalabad West.**					
1	Environmental Officer having bachelors/ masters in Environmental Sciences/Engineering with three (03) years of relevant experience for the whole project construction period.	No.	20			
2	Tree Plantation of the local species, including their maintenance for three years as proposed in EIA report. It should be done with consultantion of the Employer, Forest Department and EPA.	No.	1000			
3	Water quality monitoring / testing/analysis on quarterly basis for the whole project period at one location in grid station site.	No.	7			
4	Air quality monitoring / testing on quarterly basis for the whole project period at one location in grid station site.	No.	7			
5	Noise monitoring /analysis/measurement on quarterly basis for the whole project period at one location in grid station site.	No.	7			
	Sub Total of Item G					
H	**Trainings**					
1.	**SAS & SCADA Trainings**					
1.1	For 500/220 kV Ludewala G/s project, provide technical Training to at least Four Engineers ((01) engineers from Protection & Control dept., one (01) from Asset Management, one (01) from TSG and one from Telecom) for at least 7 working days and On-Site Trainings to at least eight no. Operational Staffs and two no. Engineers for at least 15 working days in relation	Lot	**1**			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	to Substation Automation System that shall include but not limited to following activities: 1 BCU i. Creation of mimic diagram for BCU/ HMI ii. Interlock scheme study and creation iii. Creation & addressing of digital inputs and output signals including marshalling of contacts & testing (GGIO etc) iv. Creation of GOOSE messages and testing v. Synchro check settings of BCU and measurement configuration vi. Configuration of analogue channels and transfer of measurement data to station computer and testing. vii. Interfacing of BCU with Ethernet Switch and Station Computer viii. Creation of new and configuration and reading of existing ICD/CID files for BCU					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	ix. Testing of BCU different features x. Time Synchronization of BCU and testing xi. All other activities to make engineers & operational staff competent enough so that they can commission, test and edit all the features & settings of BCU independently. 2 Ethernet Switches i. Addressing, programming & testing of signals ii. Testing of GOOSEGOOSE messages iii. Time synchronization of Ethernet Switches and testing 3 Station computer/ HMI/Server i. Practical training on use of different tools of engineering work station for configuration. ii. Creation of Single Line Diagram & configuration (applying metering, interlocking scheme, addressing,					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	switches control, etc) iii. Creation of Event Report database files and communication/ testing with BCU & IEDs etc. iv. Creation of Fault Report database files and communication/ testing with BCU & IEDs etc. v. Training to perform bay extension work in existing station without interruption. (Configuration of HMI, addresses creation & matching with different IEDs/BCUs/ Gateways/ Ethernet Switches etc.) vi. Reading, configuration & editing of existing ICD/CID/SCD files and creation of new project and SCD files etc. vii. All other activities to make engineers/staff competent enough so that they can commission, test & edit all the features and settings of HMI & Engineering Workstation independently.					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	4 Protection Relays i. Configuration of IEDs for transfer of each Event & Fault Record to station computer. ii. Configuration and marshalling of Protection IEDs as per actual scope of work e.g. Busbar Protection, Transformer differential protection etc. iii. Configuration & marshalling of digital inputs & other contacts and addresses for transfer of status signals to Station Computer. iv. Testing & creation of GOOSE messages from IEDs (from send/receive point of view between IEDs, station computer and gateways, reading & quality checking of GOOSE messages) v. Addressing of IEDs and matching with Station Computer addresses (GGIO configuration etc.) vi. Configuration of different IEDs for triggering of Fault Recorder via GOOSE messages via Ethernet Switches and testing. vii. Creation of new and configuration and reading of existing ICD/CID files for IEDs. viii. All other activities to make engineers/staff competent enough so					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	that they can commission, test and edit all the features & settings of IEDs independently. 5 Fault Recorder i. Configuration of analogue channels of fault recording system. ii. Configuration and setting of Fault Recording system. iii. Configuration of Fault Recorder for transfer of each Fault Record to station computer. iv. Configuration of Fault Recorder of triggering via GOOSE messages from different IEDs via Ethernet Switches. v. Creation of new and configuration and reading of existing ICD/CID files for event & Fault Recorders. vi) All other activities to make engineers/staff competent enough so that they can commission, test and edit all the features & settings of BCU independently. <u>Gateway</u> i. Hardware and Software configuration ii. Development of Gateway Database iii. Creating backups of Gateways database					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	iv. Cybersecurity of Gateways v. Trouble shooting: vi. Interfacing of output protocols (101 & 104) with telecom systems. vii. All other activities to make engineers/staff competent enough so that they can commission, test & edit all the features and settings of Gateway independently. Note: The expenditures of training of engineers i.e., hotel accommodation charges, Travelling Allowance/Daily Allowance, Boarding & lodging charges etc. shall be borne by the contractor/supplier.					
2.	**Local Training for Telecom**					
2.1	Ten (10) days' on-site training shall be provided to six (06) Persons covering Digital PLC Equipment, PAX, SDH Equipment, Digital Protection Signalling Equipment. The Contractor shall prepare and submit the training schedule for approval by NGC-Telecom/Engineer. Training shall be conducted by competent and certified professionals/instructors. The Contractor shall provide all necessary training documents/material, drawings, manuals (hard and soft copies) and relevant software to each trainee. All costs related to training, instructor, travel to/from the training site, boarding and lodging, daily allowances and other associated expenses shall be deemed included in the contractor's scope of work.	Men Days	60			
3	**Protection & Control**					
3.1	Requirement for Technical Training of 04 (Four Nos.) of Engineers from Protection & Control department NGC for 07. No of days on Advanced Numerical Protection Relays. The Contractor/Supplier shall provide comprehensive	Lot	1			

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	technical training on advanced numerical protection relays supplied under the Contract. The training shall be conducted by qualified and experienced protection engineers/relay specialists having demonstrable expertise in the relevant relay make and models. The training shall cover, as a minimum, the following: 1.Protection relay architecture, hardware and software configuration. 2.Protection functions and their application, including differential, overcurrent, earth-fault, distance, over/under-voltage, frequency, breaker failure, autoreclose and other relevant functions. 3.Relay setting calculation, parameterization and coordination. 4.Configuration and setting of protection schemes using the applicable relay engineering software. 5.Communication protocols and integration with the Substation Automation System (SAS), SCADA and other relevant systems. 6.Event records, fault records, oscillography and disturbance analysis. 7.Relay testing, commissioning and troubleshooting, including secondary injection testing and functional verification. 8.Retrieval and analysis of relay fault/event data and identification of protection system maloperation. 9.Maintenance, diagnostics, self-supervision and preventive maintenance of numerical protection relays. 10.Practical hands-on exercises covering relay configuration, setting modification, testing, fault analysis and troubleshooting. The training shall include both theoretical and practical/hands-on sessions.					

Item	Description	Unit	Qty	Unit Price[1]	Total Price[1]	Total Provisional Sales Tax
				Local Currency	Local Currency	
1	2	3	4	5	6=4x5	7
	The Contractor shall provide all necessary training materials, manuals, software, sample setting files, test cases and relevant technical documentation required for effective training.					
	Sub Total of H					
	Sub Total Item II (Item A to H)					
III	**Vehicles**					
1.1	**Double Cabin Pick-up 3000cc Turbo 4×4**	Nos.	3			
1.2	**Single Cabin Pick-up 2500cc Turbo 4×4**	Nos.	2			
	Subtotal of Item III					
	Sub Total Item II (Item A to L)					
	Sub Total Item II (Item A to H)					
	Sub Total Item II					
	Total (Item I, Item II & Item III)					
	Total (Item I, Item II & Item III) (Column 6) to be carried forward to Grand Summary					

[1]*Specify currency in accordance ITB 12.*

Name of Bidder: _____

signature of Bidder: _____

Schedule No.5 - Grand Summary

Schedule No.	Title	Total [1]	
		Foreign (million)	Local (million)
1	Plant & Mandatory Spare Parts Supplied from Abroad		
2	Plant & Mandatory Spare Parts Supplied from Within the Employer's Country		
3	Design Services.		
4	Installation and Other Services		
	Provisional Sum		PKR 1500
	GRAND TOTAL to be carried forward to Letter of Price Bid		

Name of Bidder _____

Signature of Bidder _____

[1] *Specify currency in accordance with ITB 12. Create additional columns for up to a maximum of 3 Foreign Currencies if required*

Schedule No. 6 - Recommended Spare Parts

Item	Description	Qty	Unit Price		Total Price	
			EXW Local Parts Local Currency	CIP Imported Parts Foreign Currency	Local Currency Portion	Foreign Currency Portion
1	2	3	4	5	6 = 3 x 4	7 = 3 x 5

Note: The bidder has to provide list of recommended spare parts in accordance with clause 6.2 of this Section-III.

Name of Bidder _____

Signature of Bidder _____

PREAMBLE TO CONDITIONS OF CONTRACT

Commencement Date

Sub-Clause 1.1.1
The date for commencement of the Works shall be **the date when all the following conditions are fulfilled:**

(i) This Contract Agreement has been duly executed for and on behalf of the Employer and the Contractor.
(ii) The Contractor has submitted to the Employer the performance security and the advance payment security.
(iii) The Site **[500kV Faisalabad West and 220kV Luedewala Substation]** is handed over to the Contractor.

Defect Liability Period

Sub-Clause 1.1.11
The Defect Liability Period is **365 days** after the date certified in the Taking-Over Certificate except critical components i.e. **Auto transformer, Shunt Reactor, Circuit Breakers, Disconnectors, Surge Arrestors, CTs and CCVTs/CVTs/PTs, Substation Automation System & Telecommunication system** for which defect liability period shall be **720 days**. Defect Liability Period shall be subject to extension as provided under Sub-Clause 30.4.

The Employer

Sub-Clause 1.1.12.
The Employer is **National Grid Company of Pakistan Limited (NGC)**
Address: Director General (Procurement) NGC,
8th Floor Shaheen Complex, Egerton Road
Lahore, Pakistan
Telephone No. 92-42-99202597
E-mail address: dg.procurement@ngc.gov.pk

The Engineer

Sub-Clause 1.1.15
The Engineer is Project Delivery *(Insert Name of Engineer)*
Address:

Time for Completion

Sub-Clause 1.1.35.
The Time for Completion is **600 days** from the Commencement Date.

The Contractor shall complete the scope of work mentioned in Section 9: Technical Provisions and in Section III-Schedule of Prices in accordance with the following mandatory completion milestones:

i). Completion Milestone-I

The Contractor shall complete, in all respects, the following works within 480 days from the Commencement Date:

1. The complete extension scope of work at 500 kV Faisalabad West Substation; and
2. The complete upgradation-related scope of work at 500 kV Ludewala Substation, except for the supply and commissioning of the Auto Transformer Banks.

By the end of the 480-day period, complete scope of works at both substations, other than the supply and commissioning of the Auto Transformer Banks, shall have been completed, tested and made fully available for operation.

The Contractor must complete all the upgradation works at 500KV Ludewala Substation scope including construction of complete 500KV switchyard, 220kv switchyard works, Transformer Bays civil works, equipment installation etc. as per Schedule of Prices in all aspects within the mentioned 480 days and only supply and commissioning of 500KV Auto Transformer Banks to be done with next 120 days.

The Contractor shall ensure that both substations are fully available to provide the required back-feed to the C-5 Project within the aforesaid 480-day period.

ii). Completion Milestone-II

The Contractor shall complete the remaining scope, including the supply, installation, testing and commissioning of the Auto Transformer Banks at 500 kV Ludewala Substation, within 600 days from the Commencement Date.

The Auto Transformer Banks, including all associated works, testing, protection, control, auxiliary systems and other activities necessary for their safe and satisfactory operation, shall be fully commissioned and ready for commercial operation by the end of the 600-day period.

c. Restriction on Use of the Additional 120 Days

The period from 481 days to 600 days shall be available only for completion of activities related to the Auto Transformer Banks and their associated works.

The Contractor shall not defer, postpone or carry forward any other work forming part of the 480-day milestone into the period beyond 480 days.

Failure to achieve the 480-day milestone shall constitute a

failure to meet a mandatory contractual milestone, notwithstanding the overall final completion period of 600 days.

d. Contractor's Planning Responsibility

The Contractor shall plan and execute the procurement, manufacturing, delivery, construction, installation, testing and commissioning activities in such a manner that:

- all works at both Substations other than the Auto Transformer Banks are completed within 480 days; and
- the Auto Transformer Banks and all associated remaining works are fully completed and commissioned within 600 days.

The Contractor shall not be entitled to any extension of time for activities that could reasonably have been completed within the 480-day milestone due to the Contractor's planning, procurement, engineering, construction or coordination arrangements.

Engineer's Duties & Authorities	Sub-Clause 2.1 Amount of Variation Order in emergency is **1% of Contract Price**
Confirmation in Writing	Sub-Clause 2.6 (i) If the Contractor shall require the confirmation it shall be notified to the Engineer within **ten (10) days**. (ii) Engineer shall confirm the decision/instruction within **fourteen (14) days**.
Ruling Language	Sub-Clause 5.1. The version in **English** language (ruling language) shall prevail.
Day to Day Communications	Sub-Clause 5.2. The language for day to day communications is **English**.
As-Built Drawings	Sub-Clause 6.10 As-Built drawings shall be provided to the Engineer within **twenty eight (28) days** from the date of issue of Taking Over Certificate.
General Obligations	Sub-Clause 8.1 Date for commencing work: Commencement Date
Programme to be Furnished	Sub-Clause 12.1. The Programme must be submitted in the form of **Bar chart or Critical Path Method (CPM), the PERT network, or other internationally used programs.**
Employer's Equipment	Sub-Clause 14.4. The following Employer's equipment is available for use by the

Contractor under the Employer's operation: **NIL**

Time for Completion
Sub-Clause 25.1
(i) Place of the Project: **(NOR-140E-2026: 500/220kV Ludewala Substation (Upgradation From 220kV Substation) and Two No. 500kV Line Bays at 500kV Faisalabad West Substation)**
(ii) Period: **As mentioned in Sub-Clause 1.1.35.**

Earlier Completion
Sub-Clause 26.3
(i) Amount of Bonus per day: **Nil**
(ii) Max. Amount of Bonus: **Nil**

Delay in Completion
Sub-Clause 27.1.
Failure to meet the Time for Completion entitles the Employer to levy Liquidated Damages as follows:
Percentage per day: **[to be calculated as [0.07]** %
Maximum: **10% of total contract price**

Prolonged Delay
Sub-Clause 27.2.
Maximum amount recoverable from the Contractor by the Employer shall be calculated in accordance with GCC 42.2.

Payment
Sub-Clause 33.5
(i) Period of Payment by Employer to Contractor: **45 days**
(ii) Period of Final Certificate of Payment: **60 days**

Payment in Foreign Currencies
Sub-Clause 35.1.
Payment in foreign currencies shall be arranged as follows: **Payment in foreign currency will be made from foreign exchange component available with NGC except to the extent of price adjustment claims under GCC 47.1 which will be paid in equivalent PKR on the date of payment to the EPC Contractor in Pakistan.**

Insurance of Works
Sub-Clause 43.1.
The deductible limits in the insurance cover of the Works: **Nil**
Sub-Clause 43.1.(a)
The additional risks to be insured are:

a) fire, smoke, explosion, falling objects, earthquake, perils of the sea, tempest, impact by aircraft or land vehicles, aircraft and other aerial devices or articles dropped therefrom, lightning, strike, riot, civil commotion, escape of water, inundation, rain, snow, landslides, flood, act of God, vandalism or malicious damage, windstorm, or hail storm and
b) collision, upset, overturn, derailment, stranding or sinking of an automobile or any conveyance of a common carrier by land, water or air in which the Goods or any part thereof are being carried including overland transportation in Pakistan from port of entry/ex-factory (Pakistan) to the Site, and

c) theft, burglary or attempted theft or burglary, and

d) any loss or damage during pre-erection storage, and

e) faults in construction and erection, lack of skill, lack of experience, negligence, malicious act, and

f) any other sudden and unforeseen event such as loss or damage due to collapse etc. on site, transport of items to be erected, and

g) actions of Employer in the operation of Goods/Work or part thereof on behalf of the Contractor.

Third Party Liability	Sub-Clause 43.3. The amount of insurance against third party liability taken out by the Contractor shall not be less than: **Rs. 4,000,000 per any one accident or series of accidents arising out of one occurrence with number of occurrences unlimited.**
Payment on Termination for Employer's Default	Sub-Clause 46.3. The additional amount payable by the Employer on termination shall not exceed: **As reasonably determined and certified by the Engineer.**
Notices to Employer and Engineer	Sub-Clause 49.2. The address of the **Employer** for notices is: Director General (Procurement) NGC, 8th Floor Shaheen Complex, Egerton Road Lahore, Pakistan Telephone No. 92-42-99202597 E-mail address: dg.procurement@ngc.gov.pk The address of the **Engineer** for notices is: Project Delivery ()
Disputes & Arbitration	Sub-Clause 50.4 Venue of Arbitration is Lahore, Pakistan.
Applicable Law	Sub-Clause 51.1. The applicable law is **the law of Islamic Republic of Pakistan**.
Procedural Law for Arbitration	Sub-Clause 51.2. The procedural law for arbitration is **Pakistan Arbitration Act 1940 as amended or any statutory modifications or re-enactment thereof for the time being in force.**
Language and Place of Arbitration	Sub-Clause 51.3. The language of arbitration is **English** language. The place of arbitration is Lahore, **Pakistan.**

The Conditions of Contract comprise two parts:

(I) General Conditions of Contract
(II) Particular Conditions of Contract

Over the years, a number of "model" General Conditions of Contract have evolved. The one used in these Standard Bidding Documents was prepared by the International Federation of Consulting Engineers (Federation Internationale des Ingenieurs-Conseils, or FIDIC), and is commonly known as the FIDIC Conditions of Contract. (The used version is the 1987 edition, reprinted in 1988 with editorial amendments.) The same will be used as GCC for this Tender Document.

The FIDIC Conditions of Contract have been prepared for an ad measurement (unit price or unit rate) type of contract, and cannot be used without major modifications for other types of contract, such as lump sum, turnkey, or target cost contracts.

The standard text of the General Conditions of Contract chosen must be retained intact to facilitate its reading and interpretation by bidders and its review by the Employer. Any amendments and additions to the General Conditions, specific to the contract in hand, should be introduced in the Particular Conditions of Contract.

The use of standard conditions of contract for all electrical/mechanical Works will ensure comprehensiveness of coverage, better balance of rights or obligations between Employer and Contractor, general acceptability of its provisions, and savings in time and cost for bid preparation and review, leading to more economic prices.

EDITORIAL AMENDMENTS

Following publication of the Third Edition of the Conditions of Contract for Electrical and Mechanical Works in 1987, a number of editorial amendments were agreed by FIDIC. The amendments have been incorporated during reprinting and the list below clarifies the differences between this copy and the original document.

Page 1	The following additional text has been inserted:
Commencement date	Sub-Clause 1.1.1.(i) The date for commencement of the Works is _____
Page 2	Sub-Clause 36.4(b) was previously Sub-Clause 36.4 The word 'Sums' following ' shall be' has been deleted.
Page 8	Sub-Clause 2.7. The missing letter 'D' has been inserted in 'Disputing' (margin note.)
Page 33	Sub-Clause 44.8(b). The word 'Contractor' on the last line was previously 'Contract'.
Page 35	Sub-Clause 49.3. The word 'or' between 'minute' and 'protocol' was previously 'of'.
Index, page (i)	The words 'Adverse physical conditions and artificial obstructions' have been deleted.
Index, page (v)	The word 'adverse' has been deleted after 'Physical conditions'.
Contract Agreement	The word 'Agreement' in the title has been capitalised.
Line 4	Inverted commas have been inserted after 'Employer'.
Line 6	Inverted commas have been inserted before the word 'the' and deleted before the word 'Contractor'.
Line 7	The comma following the word 'executed' has been deleted.
Line 15	Inverted commas have been inserted before the word 'the' and deleted after the word 'the'.
Item 4, line 2	The word 'defects' was previously 'defect'.

Item 4, line 3	The words 'become' was previously 'be come'.
Item 5, line 1	The words 'and statutes or constitutions' have been inserted after the word 'laws'.
Item 5, line 2	The words 'by their duly authorized signatories' have been inserted after the word 'hereof'.
Item 5	The remaining text of the original document has been deleted and is replaced by: 'Binding Signatures(s) on behalf of the Employer _____, and 'Binding Signatures(s) on behalf of the Contractor _____,

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PART-II: PARTICULAR CONDITIONS OF CONTRACT

1.1 Definitions

1.1	**Definitions**
1.1.1	The text of Sub-Clause 1.1.1 is deleted and substituted by the following: "Commencement Date" means the date specified in the Preamble to Conditions of Contract.
1.1.2	The text of Sub-Clause 1.1.2 is deleted and substituted by the following: "Conditions" means the Preamble to Conditions of Contract, General Conditions of Contract and Particular Conditions of Contract.
1.1.3	At the end of Sub-Clause the following is added: "Any subsequent document mutually agreed and signed by the Employer and the Contractor, shall be the part of the Contract."
1.1.5	The text of Sub-Clause 1.1.5 is deleted and substituted by the following: "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works subject to such additions thereto or deductions therefrom as may be made under the provisions hereinafter contained and remedying of any defects therein in accordance with the provisions of the Contract."
1.1.7	The word "technical data" is added before the word "samples" in first line.
1.1.11	The Defects Liability Period is the period mentioned in the Preamble to Conditions of Contract.
1.1.15	The following is added at the end of Sub-Clause: "or any other competent person appointed by the Employer as his replacement." For the purpose of this EPC/Turnkey Contract, based on two party agreement, the term Engineer is construed as Project Manager/Engineer. The Project Manager is a Person appointed by the Employer to act on behalf of the Employer for the purpose of the Contract whereas the Engineer has the same meaning as defined in GCC Sub-Clause 1.1.15
1.1.15	The words "Project Manager/" are added at the start of subclause.
1.1.23	The following paragraph is added: The word "Goods" is synonymous with "Plant."

1.1.27	The text of Sub-Clause 1.1.27 is deleted and substituted by the following: "Schedule of Prices" means the completed and priced Schedule of Prices, or any part or individual schedule thereof, submitted by the Contractor with his Bid or revised and mutually agreed and forming a part of the Contract documents.
1.1.33	The word "Tender" is synonymous with the word "Bid" and the word "Tender Documents" with the word "Bidding Documents".
	The following Sub-clauses are added:
1.1.38	"Month" means calendar month according to Gregorian calendar.
1.1.39	"Operation and Maintenance Manuals" has the meaning described in Sub-Clause 6.6.
1.1.40	"Party" means the Employer or the Contractor, as the context requires.
1.1.41	"Completion" means that the Plant (or a specific part thereof where specific parts are specified in the Contract) have been completed operationally and structurally and put in a tight and clean condition, and that the Plant or specific part thereof has passed Test on Completion as provided in GCC Clause 28.
1.1.42	"Country of Origin" means All countries of the World with whom Islamic Republic of Pakistan has commercial / trade relations except India, Israel and the countries upon which international sanctions are imposed.
1.1.43	The word "Part II" stated in FIDIC Conditions of Contract is synonymous with the word "Particular Conditions of Contract
1.1.44	"EPC/Turnkey Basis" means where the Contractor takes total responsibility for design and execution of the project with little involvement of the Employer. Under the usual arrangements of turnkey projects the contractor carries out all the Engineering, Procurement and Construction (EPC) providing a fully equipped facility ready for operation. Total responsibility of the Contractor include; but not limited to; design, supply, installation and commissioning of all mechanical and electrical equipment, civil and other works necessary for the completion and commercial operation of the Plant and shall include all such items of Plant and equipment or work, whether mentioned in the Specifications, Bid drawings, Schedule of Prices or not, which are required to make the Plant operationally complete in accordance with the guarantees prescribed under the Contract.
1.1.45	**"Warranty Certificate"** means the certificate against specified goods/equipment, to be issued by the Contractor that the goods/equipment supplied under the Contract are new, unused and incorporate all recent improvements in design and materials unless provided otherwise in the Contract and that the Contractor will be responsible for making good or replacing any defective goods/equipment during the Defect Liability Period or any extended period required under conditions of Contract.
1.3	**Interpretation** Text of Clause GCC 1.3 is substituted with following:
	"1.3.1 In the Contract, except where the context requires otherwise,

(a) words indicating one gender include all genders;
(b) words indicating the singular also include the plural and words indicating the plural also include the singular;
(c) provisions including the word "agree," "agreed," or "agreement" require the agreement to be record in writing; and
(d) "written" or "in writing" means handwritten, typewritten, printed or electronically made, and resulting in a permanent record.

1.3.2 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms.

"Incoterms" means international rules for interpreting trade terms published by the International Chamber of Commerce (latest edition), 38 Cours Albert 1er, 75008 Paris, France.

1.3.3 Entire Agreement

The Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations, and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract.

1.3.4 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party hereto.

1.3.5 Independent Contractor

The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture, or other joint relationship between the parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives, or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives, or Subcontractors and the Employer.

1.3.6 Non-Waiver

(a) Subject to GCC Subclause 1.3.6 (b) below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, nor

	shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract. (b) Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, must be dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived. 1.3.7 Severability If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract. 1.3.8 Country of Origin "Origin" means the place where the plant and component parts thereof are mined, grown, produced, or manufactured, and from which the services are provided. Plant components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.
2	**Engineer and Engineer's Representative**
2.1	**Engineer's Duties** Text of Clause GCC 2.1 is substituted with following: "The Project Manager/Engineer shall carry out the duties specified in the Contract. The Project Manager/Engineer may exercise the authority attributable to the Project Manager/Engineer as specified in or necessarily to be implied from the Contract. The Project Manager/Engineer is required to obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses of General Conditions of Contract (GCC): (a) approval of Subcontractor under Sub-Clause 4.1, (b) certifying additional costs under Sub-Clauses 11.3, (c) certifying any cost under Sub-Clause 14.6, (d) approval of extension of time under Clause 26, (e) issuing a Taking–Over Certificate under Sub-Clause 29, (f) issuing a Defects Liability Certificate under Sub-Clause 30.11, (g) issuing a Variation Order- under Clause 31, (h) fixing rates or prices under Clauses 31 and 34, (i) certifying additional costs under Sub-Clause 44.5 and

	(j) certifying additional costs under Sub-Clause 47.2; (k) Continuous monitoring, verification/inspection/recounting of materials received at site. (l) Coordinate for clearance of right of ways. (m) Management of Project Execution Plan as per Time for Completion under sub-Clause 25.1 or any determinations of any extensions under sub-clause 26.1 Except for such variations pursuant to Sub-Clause 31.1 of the GCC which may be necessary in an emergency affecting safety of life, the Works or of adjoining property. Except as expressly stated in the Contract, the Project Manager/Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract."
2.6	**Confirmation in Writing** (i) In line 3 after the words "undue delay" the following is added: "but not after the number of days mentioned in the Preamble to Conditions of Contract from the instruction or decision." (ii) At the end of Sub-Clause 2.6, the following is added: "The Engineer shall confirm or otherwise within the period mentioned in the Preamble to Conditions of Contract from the receipt of requirement(s) from the Contractor."
2.7	Disputing Engineer's Decisions and Instructions The following text is deleted: "If either party ……. in accordance with the Contract."
2.8	Replacement of Engineer The text of Sub-Clause is deleted and substituted by the following: "The Employer may from time to time appoint some other person as the Project Manager/Engineer in place of the person previously so appointed, and shall give notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the Plant."
2.9	Sub-Clause 2.9 is added as follows: Project Manager/ Engineer Not Liable "Approval, reviews and inspection by the Project Manager/Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of remaining materials and equipment for the Works and parts thereof and complete the remaining erection works and testing and commissioning in accordance

	with the Contract and neither the Project Manager/Engineer's authority to act nor any decision made by him in good faith as provided for under this Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Project Manager/Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any of the Works. However the Contractor shall be compensated if any loss/damage is occurred due to the decision of the Project Manager/Engineer."
3.1	**Assignment** First sentence of sub-clause is replaced with following: "The Contractor shall not assign the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder without written consent from the Employer."
4.1	**Subcontracting** Text of sub-clause is deleted in its entirety and replaced with following: "4.1.1 The Schedule E (Form SUBCON) to the Contract Agreement specifies major items of plant and services and a list of approved Subcontractors against each item, including manufacturers. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time propose any addition to or deletion from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient time so as not to impede the progress of work on the Works. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties, or responsibilities under the Contract. 4.1.2 The Contractor shall select and employ its Subcontractors for such major items from those listed in the lists referred to in GCC Subclause 4.1.1. 4.1.3 Notwithstanding above, for items & parts of work not specified in Schedule E to the Contract Agreement, the Contractor shall employ subcontractors with prior approval of Employer.
	GCC Subclauses 4.2 to 4.4 are added as follows:
4.2	**No Contractual Relation between Subcontractor and the Employer** Nothing contained in the Contract Documents shall create any contractual relation between any Subcontractor and the Employer. However, each subcontract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GCC 4.3 (if and when applicable), or in event of termination by the Employer under GCC 45.2.
4.3	If a Sub-contractor's obligations extend beyond the expiry date of the relevant Defects Liability Period and the Project Manager, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.

4.4	The Contractor shall not assign any manufacturing work for any Plant or part thereof to any firm other than the Manufacturer(s) named in his Bid and has been accepted by the Employer. In unavoidable circumstance, prior approval of the Employer shall be obtained by the Contractor for assigning any manufacturing work to a manufacturer not named as such in the Contract in Schedule E (Form SUBCON). Nothing contained in the Contract shall create any contractual relationship or professional obligation between any manufacturer and Employer. Onus of any discrepancy in the manufacture shall be on the Contractor.
5.3	**Priority of Contract Documents** Text of Sub-Clause 5.3 is deleted and substituted by the following: "Unless otherwise provided in the Contract, the priority of the Contract Documents shall be as follows: 1. The Contract Agreement (if completed) 2. The Letter of Acceptance 3. The completed Letters of Technical and Price Bids 4. The priced Schedule of Prices 5. Preamble to Conditions of Contract 6 The Particular Conditions of Contract 7. The General Conditions of Contract 8. The Specifications(Technical Provisions, Special Provisions and all relevant NGC specifications) 9. The completed Schedules to Bid (A to L) 10. The Drawings 11. Any other document forming part of the Contract. However, the Employer may modify the order of precedence of above listed documents during formation of Contract Agreement. The Contractor shall be responsible for provision of (13) Nos. Copies of the Contract Agreement free of charge. The documents shall be arranged in the aforementioned sequence and provided to Employer within 10 days of signing of Contract Agreement.
5.4	**Documents Mutually Explanatory** Paras 2 & 3 of subclause are deleted and replaced with following: "The Technical Specifications are taken to be correct, but complete accuracy is not guaranteed. Any error or ambiguity must be reported to the Employer and the Project

	Manager/Engineer before starting the work affected. In the event of any dispute arising as to the true intended meaning of Technical Specification/Provisions, the Project Manager/Engineer shall interpret the same and his interpretation shall be accepted as final and binding upon all parties concerned, except to the extent provided for in the Arbitration provisions hereof."
	Subclause GCC 5.5 is added as follows:
5.5	"Codes and Standards Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date 28 days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied subject to approval by the Employer and shall be treated in accordance with GCC Clause 31."
6.1	Contractor's Drawings The title and text of Subclause GCC 6.1 is substituted as follows: "6.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good engineering practice. 6.1.2 The Contractor shall submit to the Engineer the following drawings/ documents for approval within the time given in the Contract or as per Programme submitted according to GCC Subclause 12: **(a) Outline Schematics and Civil Works Drawings** Outline schematics, civil, electrical and mechanical drawings of all the Plant to be furnished under the Contract, together with overall and handling weights and dimensions of the Plant to be provided under the Contract. Single Line Diagrams, general layout drawings, interlocking and base design drawings shall also form part of the outline drawings. The drawings shall also show the methods, equipment required and clearances necessary for erection and dismantling. Architectural and structural drawings of civil works showing detail of all loads, forces and moments acting on the structures. **(b) Detailed Drawings** All computations, drawings, functional description of the equipment and schemes and other information required to check adequacy of the design shall accompany drawings submitted for approval. The drawings shall be complete, shall have been reviewed and checked by the Contractor and shall be submitted in due time and in logical order to

facilitate proper coordination.

(c) Drawings, Data and Instruction Manuals

The following drawings shall be submitted in accordance with Schedule required by GCC 12.1:

i. Single Line Diagrams.
ii. Protection & Metering Logic Diagrams
iii. Substation Layouts and Sections
iv. Foundation and Trench arrangement drawings
v. Substation Control % Protection Schematics.
vi. Trip Logic Diagrams
vii. Interlocking Diagrams
viii. Signal Lists
ix. Specific Works Data/Technical Data and manufacturer's catalogues of all electrical and mechanical equipment.
x. Constructional details of all electrical and mechanical equipment.
xi. Substation Earthing System Drawings & Design Report
xii. Dimensions print of all electrical and mechanical equipment.
xiii. Control Diagrams of Circuit Breakers and Disconnectors.
xiv. Complete Drawings for Auto Transformers and Shunt Reactors schematics of control/ auxiliary panels.
xv. Panel wiring diagrams.
xvi. Fabrication and assembly drawings of switchyard and indoor equipment.
xvii. Erection drawings.
xviii. Current/ voltage transformer performance (stability & accuracy calculations)
xix. Relay settings calculations,
xx. Substation Automation System (SAS) drawings.
xxi. Telecommunication Engineering drawings.
xxii. Telephone, paging system drawings.
xxiii. Firefighting system drawings
xxiv. Substation Earthing System Drawings & Design Report.
xxv. Substation Lightning System Drawings & Design Report

	xxvi.	Substation Lighting System Drawings & Design Report
	xxvii.	Terminal loading calculations of switchyard equipment
	xxviii.	Bus Bar design Report
	xxix.	Battery Sizing Calculation
	xxx.	AC and DC Station Service Drawings.
	xxxi.	Cable Sizing calculations including voltage drop calculations for AC/DC circuits.
	xxxii.	Cable Schedules and terminal plans.
	xxxiii.	Civil Works drawings
	xxxiv.	Structural and Architectural drawings.
	xxxv.	Drainage System Drawings.
	xxxvi.	Following drawings for Control House Building & Mechanical Service Building: (a) Equipment Layout and equipment foundation details (b) Design details and layout of cable trenches, cable trays and cable racks (c) Layout of grounding cables for equipment grounding (d) Detail of all wall and roof openings (e) Building Lightning protection drawings (f) Electrical wiring drawings (g) Any other detail necessary for installation of equipment in buildings
	xxxvii.	Name plate drawings.
	xxxviii.	Instruction, operation and maintenance manuals for all equipment.
	xxxix.	Such other drawings as are required by the Project Manager to demonstrate that all parts of the Plant being furnished / erected conform to the requirements of the Specifications.
		The Engineer shall signify his approval or disapproval thereof. If he fails to do so within the time given in the Contract or if no time limit is specified, within twenty eight (28) days of receipt, they shall be deemed to be approved. Approved data, drawings, samples and models shall be signed or otherwise identified by the Engineer. The Project Manager's approval, with or without modification of the document furnished by the Contractor subject to subclause GCC 6.2, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract. The Contractor shall supply additional copies of approved data/ drawings in the form and numbers stated in the Contract.

	Any part of the Works covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.
6.2	**Consequences of Disapproval of Contractor's Drawings** Full stop is deleted and the following words are added at the end of Sub-Clause: "for the approval of the Engineer. However, the Contractor shall not be entitled for time extension on this account. If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto then the same shall be resolved in accordance with clause GCC 50 hereof."
6.6	**Operation and Maintenance Manuals** Para 2&3 are deleted and the following text is added at the end of Para 1 of Sub-Clause: "The Operation and Maintenance Manuals shall include full instructions for the operation, servicing and maintenance of the Plant, not only during the period of the Contractor's liability but more particularly during its operating life. The directions shall be set out simply, clearly and systematically. This may be divided into two volumes if desirable, one for operation and the second for servicing and maintenance (in sub–volumes for major items of Plant). The operational data shall include a complete physical and functional description of the Plant (in sub–volumes for major items of Plant) and step–by–step procedures for inspection, checking and adjustments for proper operation of the Plant. The maintenance data shall include complete instructions for routine checks, servicing, maintenance and repair of all parts and for dismantling, handling and re–assembly of all equipment, sub–assemblies and all separate components. The maintenance data shall also include where possible parts catalogues The lists shall provide all necessary information for identifying the parts and for re–ordering the parts including name of part, part number and catalogue references where applicable, name of manufacturer, size, capacity and other characteristics General arrangements, single line diagrams and detailed drawings shall be provided for ready reference in the operation and maintenance instructions. The manuals shall be printed on ISO paper size A4 (210x297 mm) with offset or equivalent printing strongly bound in a durable stiff cover bearing the title in approved legend. Drawings shall be folded or reduced to 297 mm height. All volumes shall bear on the spine an approved shortened version of the title.

	The Contractor shall submit three (3) draft copies for approval of the Engineer prior to producing finished volumes. The Contractor shall provide ten (10) copies of the approved Operation and Maintenance Manuals prior to Taking Over by the Employer. Supplementary Operation and Maintenance Manual shall be provided by the Contractor, if required, to incorporate changes resulting from experience during the operation and maintenance period. The work shall not be considered to be completed for the purpose of taking over until such manual and drawings have been supplied to the Employer."
6.9	Manufacturing Drawings The words "Unless otherwise specified in Part-II" are deleted and the following is added at the end of Sub-Clause: "However, the Contractor is required to disclose to the Engineer or the Employer any confidential information necessary to justify the reliability, the efficiency and the operation and maintenance of the Plant supplied by him."
6.10	"As–Built" Drawings The following new Sub-Clause is added: The Contractor shall furnish to the Engineer six (6) copies and one (1) reproducible of approved quality of all "As–Built" drawings within the period mentioned in the Preamble to Conditions of Contract.
7.2	Errors by Employer or Engineer The subclause GCC 7.2 is deleted in its entirety.
8	Contractor's Obligations
	Text of sub-clause GCC 8.1 is deleted and substituted with following:
8.1	General Obligations
	(a) The Contractor shall commence the work on the date specified in the Preamble to Conditions of Contract and shall proceed with the same with due expedition and without delay. (b) Unless otherwise expressly limited in the Special Provisions and Technical Provisions, the Contractor's obligations cover the provision of all Works and the performance of all Installation Services required for the design, the manufacture (including procurement, quality assurance, testing and delivery) and the installation (including construction, associated civil works and erection), completion, and commissioning of the Plant in accordance with the plans, procedures, specifications, drawings, codes, and any other documents as specified in the sections Special Provisions and Technical Provisions. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, spare parts (as

	specified in GCC Subclause 8.1(d) below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures, and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage. (c) The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Plant as if such work and/or items and materials were expressly mentioned in the Contract. (d) In addition to the supply of Mandatory Spare Parts included in the Contract, the Contractor agrees to supply spare parts required for the operation and maintenance of the Plant, given in Schedule of Price No. 6 for a period of five (05) years. However, the identity, specifications, and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor, and the price of such spare parts shall be that given in Schedule of Price No. 6, which shall be added to the Contract Price. The price of such spare parts shall include the purchase price therefore and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts.
10.1	Performance Security Sub-Clause 10.1 is deleted and substituted by the following: "The Contractor shall provide a Performance Security in the prescribed Form annexed to these Documents. The said Security shall be furnished by the Contractor within 28 days after the receipt of Letter of Acceptance. The Performance Security shall be of an amount equal to 10 percent of the Contract Price in the currency(ies) of the Contract at the option of the bidder, in the form of Bank Guarantee from any Scheduled Bank in Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan For avoidance of doubt, the Bank Guarantee issued by a foreign bank, without counter guarantee from a Scheduled Bank in Pakistan shall not be considered as an acceptable Bank Guarantee. The cost of complying with the requirements of this Sub-Clause shall be borne by the Contractor."
10.2	Period of Validity Sub-Clause 10.2 is deleted and substituted by the following: "The Performance Security shall be valid upto and shall become null and void on issuance of Defect Liability Certificate, provided, however, that if the Defects Liability Period has been extended on any part of the Works pursuant to GCC Sub clause 30.4

	hereof or for the Goods/Equipment covered under extended defect liability period under sub Clause 30.1 , the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration. Notwithstanding above, if the Contractor, pursuant to GCC Subclause 1.1.11, is liable for an extended defect liability obligation for equipment mentioned therein, the performance security shall be extended for the period and up to10% of the amount proportionate to the Contract Price of such equipment, upon expiration whereof it shall be returned to the Contractor."
10.3	Claims under Performance Security Sub-Clause 10.3 is deleted in its entirety.
	The following Sub Clause is added:
10.4	Performance Security Binding on Variations and Changes "The Performance Security shall be binding irrespective of variations and changes in the quantities of the Works or extensions in completion time of the Works, which are granted or agreed upon under the provisions of the Contract."
10A	Advance Payment Security
10A.1	The Contractor shall, within 28 days after the receipt of Letter of Acceptance, provide a security in an amount equal to the advance payment calculated in accordance with Clause GCC 33 herein below, and in the same currency or currencies.
10A.2	The security shall be in the form of Bank Guarantee provided in the Bidding Documents or in another form acceptable to the Employer, issued by a Scheduled Bank of Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan in favor of the Employer valid for a period twenty eight (28) days beyond issue of taking over certificate. However, such Guarantee shall be progressively reduced by the amount repaid by the Contractor as indicated in Interim Payment Certificates of the Engineer issued in accordance with provisions of this Contract (The amount will be assumed repaid only when the employer has paid the monies against Interim Payment Certificate and not merely on issuance of interim payment certificate). The advance payment shall not be subject to retention.
11.1	Site Data The text of subclause GCC 11.1 is substituted with following: "The Tender shall be deemed to have been based on such data on climatic, hydrological and general conditions on the Site and for the operation of the Works available to or collected by the Contractor for the purposes of the Tender. The Contractor shall be responsible for his own interpretation of such data. The Contractor shall satisfy himself as to the nature of the ground, subsurface soil condition, the hydrological and climatic conditions, the form and nature of the Site, the quantities and nature of the Work and materials necessary for the completion of the

	Works, and the means of access to the Site, the accommodation he may require and in general shall himself obtain all necessary information as to risks, contingencies, and other circumstances which may influence or affect his Bid. The Employer does not guarantee the correctness of any data/information/drawings either verbal and/or written provided herein nor any interpretations, deductions or conclusions relative to conditions at Site. The Contractor shall form his own opinion of the character of the work and of the materials to be excavated etc. He shall make his own interpretations, and satisfy himself by his own investigations and research re-garding all conditions affecting the work to be done. The Contractor shall assume all responsibility for deductions and conclusions as to the nature or conditions of the materials to be excavated and of doing other work affected by the geology at the Site."
11.2	Sufficiency of Contract Price First para of Subclause is substitutes as under: "Subject to Clause GCC 11.1, the Contractor shall be deemed to have satisfied himself of correctness and sufficiency of the Contract Price, which shall cover all his obligations under the Contract and to have taken account of in his Tender:" The words "(if access has been made available to him)" are deleted from point (c). Last para of subclause is deleted.
11.3	**Physical Obstructions and Conditions** First para of subclause is replaced with following: "Subject to GCC subclause 11.1, if during the execution of the Works on Site the Contractor encounters physical obstructions or conditions of the kind stipulated in Sub-Clause 26.1.c) which could not have been reasonably foreseen by the Contractor prior to the award of Contract, the Contractor shall be entitled to recover the additional cost incurred in consequence."
12.1	**Programme to be Furnished** Text of subclause is replaced with following: The Contractor shall submit to the Engineer for his approval the Programme which shall contain the following: (a) The order in which the Contractor proposes to carry out the Works (including preliminaries, design, manufacture, required material ordering, delivery to Site, installation, erection and rectifications work, testing, commissioning of the Plant including design and construction of associated civil works and taking–over by the Employer). The program so submitted by the Contractor shall accord with the Time of Completion in GCC Subclause 25.1 and any other dates and periods

	specified in the Contract. The programme shall be based on format mentioned in Preamble to Conditions of Contract. The programme shall also include the following: (i) Employment of local and expatriate labour of various categories; (ii) Local material procurement; and (iii) Material imports, if any. (b) the times when submission and approval of the Contractor's Drawing are required, (c) the times by which the Contractor requires the Employer: (i) to furnish any Employer's Drawings, (ii) to provide access to the Site, (iii) to have obtained consents, wayleaves and approvals necessary for the purpose of the Works. The programme is to be furnished by the Contractor within twenty eight (28) days from the date of receipt of Letter of Acceptance and in the form acceptable to Project Manager. The Project Manager/Engineer's proposed changes/modifications may also be incorporated and revised program shall be submitted within fifteen (15) days. The approval by the Engineer of the Programme shall not relieve the Contractor or the Employer from any obligation under the Contract.
12.3	**Revision of Programme** Second para of subclause is deleted. Following is added at the end of first para of subclause: "The Contractor shall, at the instruction of the Project Manager, prepare and submit to the Project Manager a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Plant within the Time for Completion under GCC Subclause 25.1 or any extension thereof entitled under GCC Subclause 26.1."
12.4	The following Sub-Clauses 12.4 to 12.6 are added: **Monthly Progress Report** "During the period of the Contract, the Contractor shall submit six sets of report to the Engineer not later than the 8th day of each month, including: (i) a construction schedule indicating the progress achieved during the preceding

	month; (ii) description of all work carried out since the last report; (iii) description of the work planned for the next forty two days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing; (iv) summary of daily job record for the preceding month; and (v) colour photographs to illustrate progress. The progress report shall be in a form acceptable to the Project Manager and shall indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken."
12.5	**Daily Job Record** During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Project Manager/Engineer as and when requested. The daily record shall include particulars of weather conditions, number of men working in different categories, deliveries of materials, quantity, location and assignment of equipment.
12.6	**Protection of the Environment** 12.6.1 The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise, and other results of his operations. 12.6.2 The Contractor shall ensure that emissions, surface discharges, and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws 12.6.3 The Contractor will ensure that the preparation, design, and implementation of project comply with: a) all applicable laws and regulations of Pakistan relating to environment, health, and safety; b) the Environmental Safeguards; c) the Environment Assessment Review Framework (EARF); d) all measures and requirements set forth in the respective EIA/IEE and EMP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.

Pakistan Environmental Protection Act (PEPA) 1997, Provincial Environmental Protection Acts & Other Agencies and provisions of IEE of the project shall be strictly adhered to.

12.6.4 **Environmental Safeguards:**

The Contractor shall (a) establish an operational system for managing environmental impacts, (b) implement all the monitoring and mitigation measures set forth in the initial environmental examination and/or environmental management plan, (c) allocate the budget required ensuring that such measures are carried out, d) submit monthly environmental monitoring reports to the Employer.

The Contractor shall comply with (i) the measures and requirements set forth in the initial environmental examination and the environmental management plan; and (ii) any corrective or preventative action plans worked out to correct non-compliances.

Specially, Contractor(s) shall ensure that:

A policy of incorporating and integrating environmental considerations into the operations for the Project as shown in the Environmental Management Plan, which is attached in Volume II is pursued.

a) Following the award of the contract and prior to construction commencing the Contractor(s) will review the EMPs and develop this into a detailed Site-Specific Environmental Management Plan(s) (SEMP) that amplifies the conditions established in the EMP that are specific for the sites and the tasks involved.
b) The SEMP(s) will be submitted to the Environment and Social Impact Cell of Employer for approval at least 10 days before taking possession of any work site.
c) No access to the site will be allowed until the SEMP is approved by the Environment and Social Impact Cell of Employer.
d) All mitigation and monitoring measures determined in the SEMPs are incorporated in detailed design and implemented during construction of the Project facilities in letter and spirit;
e) Environmental monitoring, including instrumental water and air quality, and noise monitoring, as well as other types of monitoring defined in the IEE and EMP should be conducted on a daily basis and records stored, and reported to ESIC;

	f) Monthly environmental monitoring reports summarizing daily monitoring data should be submitted to Environment and Social Impact Cell of Employer; Quarterly progress reports should include a summary of environmental monitoring. g) Site Environment Specialist (s) with background in environmental management or similar discipline, and be able to complete the preparation of the site specific environmental management plans are appointed. The CVs of the applicants for the position should be shared with Environment and Social Impact Cell of Employer and the appointment should only be confirmed after approval from ESIC. h) All contracts under the subprojects contain provisions on compliance with these requirements; Budget for all such environmental and social measures is made available; i) A system for recording and communicating any complaints received by any person employed by or contracted to the Contractor (s) should be established. All complaints will be communicated in writing to the ESIC within one working day of their receipt. j) Trees *(Minimum 05-Feet in height)* plantation is carried out in accordance with the Environmental Approval obtained from the respective Environmental Protection Agency (EPA) and in accordance with the aesthetic value of the area. k) All invoices/amounts claimed by contractor (s) in lieu of Environment& Social Safeguards Management would be sent to ESIC for verification in order to make things proper and transparent; l) Safety signs and awareness material printed in Urdu & English languages (4 x 6 feet Panaflexes) are placed & visible at project sites. m) Pathways and access roads, other local infrastructure (sewerage line, water transporting system/pipes, rainwater drainage system etc.) damaged due to construction activity at the project site and agricultural land are restored to at least pre-project condition upon the completion of construction works. n) In case of non-compliance with mitigation measures defined in SEMP, Employer has the right to suspend work and withheld payments till the remedial measures will be undertaken. The failure to implement a corrective action plan and to implement it within the required time frame will result in the owner undertaking the works and the cost, plus up to 10% will be recovered from interim payments or the final payment to the Contractor. No extension of time will be allowed to the contractor in this regard.

13.1	**Contractor's Representative** Text of Subclause is substituted with the following: "13.1.1 If the Contractor's Representative is not named in the Contract, then within 14 days of the Commencement Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within 14 days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within 14 days giving the reason therefor, then the Contractor shall appoint a replacement within 14 days of such objection, and the foregoing provisions of this GCC Subclause 13.1.1 shall apply thereto. 13.1.2 The Contractor's Representative shall represent and act for the Contractor at all times during the performance of the Contract and shall give to the Project Manager/Engineer all the Contractor's notices, instructions, information, and all other communications under the Contract. All notices, instructions, information, and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided. The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GCC Subclause 13.1.1 13.1.3 The Contractor's Representative may, subject to the approval of the Employer which shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions, and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager. Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GCC Subclause 13.1.3 shall be deemed to be an act or exercise by the Contractor's Representative. 13.1.4 The Contractor's Representative shall be present on the Site during all working hours and shall not be transferred from the Site without the consent

	of the Project Manager/Engineer. The Contractor's Representative shall be a registered professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976)."
13.2	**Objection to Contractor's Employees** Following sentence is added at the end of subclause: "The Contractor shall, where required, promptly appoint a replacement thereof.."
13.3	Subclauses 13.3 and 13.4 are added as follows: **Staff of Contractor** A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately super
13.4	**Employment of Local Personnel** The Contractor shall, to the extent practicable and reasonable, employ staff and labour from sources within Pakistan.
14.1	**Contractor's Equipment** Replace the word "or" at the end of Sub-paragraph (a) by the word "and" and insert the following at the end of Sub-paragraph(b): "which shall not be unreasonably withheld."
14.2	**Safety Precautions** At the end of the Sub-Clause the following is added: "In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the safety requirements of the Government of Pakistan with such modifications thereto as the Project Manager/Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Project Manager/Engineer may determine to be reasonably necessary for such purpose. The Contractor shall make, maintain, and submit reports to the Project Manager/Engineer concerning safety, health and welfare of persons and damage to property as the Project Manager/Engineer may from time to time prescribe."
14.3	**Electricity Water and Gas**

	The text of Sub-Clause 14.3 is deleted and substituted by the following: "The Contractor shall be responsible for making his own arrangements for the adequate supply of electricity, water and gas required for the effective performance of his obligations under the Contract. Subject to the aforesaid, the Contractor shall be entitled to use for the purposes of the Works such supplies and services as may be available on the Site. The Contractor shall, before the commencement of the work at Site, seek the approval of the Project Manager/Engineer as to his detailed requirements of electricity, water and gas for the entire Contract period. The Contractor shall pay the Employer at the rates/cost incurred by the Employer. The Contractor shall at his own cost provide any apparatus necessary for such use. The contractor will bear the cost of distribution network for electricity, potable water, telephone, gas and their consumption by his own personnel for the purpose of the work."
14.4	**Employer's Equipment** The text of Sub-Clause 14.4 is deleted and substituted by the following: "The Employer shall, if the Contractor so requests for the execution of the works, operate any available equipment of which details are given in the Preamble to Conditions of Contract. The Contractor shall pay the Employer a mutually agreed price for such use. The Employer shall during such operation retain control of and be responsible for the safe working of the equipment."
14.6	**Opportunities for Other Contractors** Following paras are added at the end of subclause: "The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other contractors. The Project Manager/Engineer shall determine the resolution of any difference or conflict that may arise between the Contractor and other contractors and the workers of the Employer in regard to their work. The Contractor shall notify the Project Manager/Engineer promptly of any defects in the other Contractors' work that come to its notice, and that could affect the Contractor's work. The Project Manager shall determine the corrective measures, if any, required to rectify the situation after inspection of the Works. Decisions made by the Project Manager/Engineer shall be binding on the Contractor."
14.8	**Information for Import Permits and Licenses** The text of subclause is deleted and substituted with following:

	"The Contractor shall acquire and pay for all permits, approvals, and/or licenses from all local, state, or national government authorities or public service undertakings in Pakistan, which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals, and/or licenses that are not the responsibility of the Employer under GCC Subclause 17.5 hereof and that are necessary for the performance of the Contract. The Contractor shall submit to the Employer in good time such details of all Plant and Contractor's Equipment to be imported into Pakistan for which it requires Employer's assistance and identify as to what assistance of the Employer is required for obtaining by the Contractor of all necessary import permits or licenses."
14.9	The following Subclause GCC 14.9 is added: Procurement and Transportation 14.9.1 The Contractor shall procure and transport all materials in an expeditious and orderly manner to the Site. The Contractor shall adequately record the condition of roads, agricultural land and other infrastructure prior to the start of transporting materials, goods and equipment, and construction. 14.9.2 The Contractor shall at its own risk and expense transport all the materials and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances. 14.9.3 Unless otherwise provided in the Contract, the Contractor shall be entitled to select any safe mode of transport operated by any person to carry the materials and the Contractor's Equipment. 14.9.4 Upon dispatch of each shipment of materials and the Contractor's Equipment, the Contractor shall notify the Employer by telex, cable, facsimile, or electronic means, of the description of the materials and of the Contractor's Equipment, the point and means of dispatch, and the estimated time and point of arrival in Pakistan, if applicable, and at the Site. The Contractor shall furnish the Employer with relevant shipping documents to be agreed upon between the parties. 14.9.5 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the materials and the Contractor's Equipment to the Site. The Employer shall use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining such approvals, if requested by the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any claim for damage to roads, bridges, or any other traffic facilities that may be caused by the transport of the materials and the Contractor's Equipment to the Site.

15.2	**Compliance with Laws** The Sub-Clause 15.2 is deleted and substituted by the following: "The Contractor shall comply with the laws of the country of manufacture concerning the manufacture of the Plant, and the Laws of Pakistan where the Plant is to be erected. The laws will include all local, state, national, or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties, and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel."
	Following GCC subclauses 16.4 to 16.6 are added:
16.4	**License/Use of Technical Information** (a) For the operation and maintenance of the Plant, the Contractor hereby grants a non-exclusive and nontransferable license (without the right to sublicense) to the Employer under the patents, utility models, or other industrial property rights owned by the Contractor or by a third party from whom the Contractor has received the right to grant licenses thereunder, and shall also grant to the Employer a nonexclusive and nontransferable right (without the right to sublicense) to use the know-how and other technical information disclosed to the Employer under the Contract. Nothing contained herein shall be construed as transferring ownership of any patent, utility model, trademark, design, copyright, know-how, or other intellectual property right from the Contractor or any third party to the Employer. (b) The copyright in all drawings, documents, and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.
16.5	**Photographs of Works and Advertisement Prohibited** Except with the prior written authorization of the Employer the Contractor shall not exhibit or permit to be exhibited any photographs or advertisement on the Works. Any authorized exhibition shall be immediately removed if the Employer so requires.
16.6	**Training of Employer's/ Engineer's Staff** The Contractor shall provide such facilities for the training of such numbers of Pakistani engineers, engineering students, apprentices and trade apprentices on such sections of the Works at the Site or on the Contractor's premises or Contractor selected plant manufacturer's premises and factories, or wherever else work is in hand, as specified or directed by the Project Manager/Engineer. The Employer shall direct what

	sums by way of wages and allowances are to be paid by the Contractor to such persons and shall reimburse the Contractor for such sums as are so directed to be paid and are paid. The Contractor shall also provide medical expenses or medical insurance and travelling expenses for trainees if required by the Employer which shall be reimbursed by the Employer. The language of training at the above stated premises shall be English and Urdu.
17.1	**Access to and Possession of the Site** GCC Subclause 17.1 is substituted with following: "The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way. The Employer shall give access to and possession of Site which, however, may not be exclusive to the Contractor."
17.4	**Consents and Way Leaves** The Sub-Clause 17.4 is deleted and substituted by the following: "The Employer shall issue permissions, letters, certificates and provide such other assistance to the Contractor for his obtaining permits-to-work, way leaves and approvals from any other department/authority and right of way from private owners, if required. The Contractor will bear the cost of logistics, fees, etc. for such activities. The Employer, will reimburse the Contractor only the payments made by him in respect of any land compensation for obtaining such way leaves, required for the Works."
17.5	**Import Permits and Licenses** Subclause GCC 17.5 is replaced with following: "The Employer shall acquire and pay for all permits, approvals, and/or licenses from all local, state, or national government authorities, or public service undertakings in Pakistan which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals, and/or licenses necessary for the execution of the Contract from all local, state, or national government authorities, or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain."
18.1	**Engagement of Labour**

	At the end of the Clause the following is added: "in accordance with the regulations, orders and requirements of the Govt. of Pakistan. The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor. The Contractor shall inform the Contractor's personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, and allowances as are chargeable under the Laws for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws." "
18.3	**Working Hours** The last sentence "The extra cost, ……. of the Contractor." of subclause is deleted.
	Following sublauses GCC 18.5 to GCC 18.16 are added:
18.5	**Employment of Persons in the Service of Others** The Contractor shall not recruit or attempt to recruit his staff and labour from amongst the persons in the service of the Employer or the Project Manager/Engineer and vice–versa, unless mutually agreed between the Employer/Project Manager/Engineer and the Contractor.
18.6	**Alcoholic Liquor or Drugs** The Contractor shall not, otherwise than in accordance with the statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale gift, barter or disposal by his Subcontractors, agents, employees or labour.
18.7	**Arms and Ammunition** The Contractor shall not give, barter or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.
18.8	**Festivals and Religious Customs** The Contractor shall in all dealings with his staff and labour have due regard to all

	recognized festivals, days of rest and religious or other customs.
18.9	**Disorderly Conduct** The Contractor shall at all times take all reasonable precautions to prevent any unlawful riotous or disorderly conduct by or amongst his staff and labour and for the preservation of peace and protection of persons and property in the neighborhood of the Works against the same.
18.10	**Site Regulations and Safety, Health and Safety, Funeral Arrangements** 18.10.1 The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Project Manager, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld. Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety of the Works, gate control, sanitation, medical care, and fire prevention. 18.10.2 The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay, and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. 18.10.3 The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the performance of the Contract, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority. 18.10.4 The Contractor shall send to the Project Manager, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety, and welfare of persons, and damage to property, as the Project Manager may reasonably require. 18.10.5 The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide. 18.10.6 In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities, for purpose of dealing with and overcoming the same.

	18.10.7 In the event of the death of any of the Contractor's personnel or accompanying members of their families, the Contractor shall be responsible for making the appropriate arrangements for their return or burial.
18.11	**Reporting of Accidents** The Contractor shall report to the Project Manager/Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition to appropriate action required under the law, notify the Project Manager/Engineer immediately by the quickest available means.
18.12	**Compliance by Subcontractors** The Contractor shall be responsible for compliance by his Subcontractors of the foregoing provisions.
18.13	**Housing for Labour** Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be handed over to the Employer or if the Employer so desires, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Project Manager/Engineer.
18.14	**Supply of Water and Foodstuff** The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Project Manager/Engineer or his representative, adequate supply of drinking and other water for the use of his staff and labour. The Contractor shall also arrange for the provision of a sufficient supply of suitable food at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.
18.15	**Prohibition of All Forms of Forced or Compulsory Labor** The contractor shall not employ "forced or compulsory labor" in any form. "Forced or compulsory labor" consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.
18.16	**Prohibition of Harmful Child Labor** The Contractor shall not employ any child to perform any work that is economically

	exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.
19.1	**Manner of Execution** The following is added at the end of Sub-Clause: "The Contractor shall submit for approval of the Project Manager/Engineer, his detailed method statement(s) for the execution of such items of work as may be desired by the Project Manager/Engineer. Approval of such method statement(s) shall neither relieve the Contractor of his responsibilities under the Contract nor form any basis for claiming additional costs."
	Sub-Clause 19.3 Uncovering Work The following is added at the end of second paragraph of Sub-Clause 19.3: "In any other case, all costs shall be borne by the Contractor."
19.4	**Use of Pakistani Materials** The following Sub-Clause 19.4 is added: "The Contractor shall so far as may be consistent with the Contract make the maximum use of materials, supplies and equipment indigenous to or produced in Pakistan and services available in Pakistan or operated in Pakistan provided such materials, supplies, equipment and services shall be of required standard."
20.2	**Inspection and Testing During Manufacture** Subclause 20.2 is replaced with following: 20.2.1 The Contractor shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and any part of the Plant as are specified in the Contract. 20.2.2 Authorized representatives of Employer i.e. (i) Two representative of Director General (Substation Engineering) NGC in case the equipment is listed in NGC's Type Test Policy. (ii) Two representatives of Director General (Substation Engineering) NGC for all other equipment. shall carry out pre-shipment inspection of the plant/material/equipment at manufacturer's works. All reasonable facilities (laboratory, tools, instruments, machines, samples etc.) as provided in the specifications or followed by trade and industry in general shall have to be offered to the inspectors, by Contractor at his expense for carrying out Testing and Inspection. The Contractor shall fully assist the nominated inspectors in

		submission of visa application(s) by providing all supporting document on his part and help in attaining visa through necessary correspondence with the embassy.
	20.2.3	Two authorized representatives of Director General (Substation Engineering), shall witness the Type Tests (if applicable in accordance with clause 4, subsection-2 (Technical Specifications) of Section-10 (Technical Provisions) as per NGC type test policy. The Contractor shall fully assist the nominated inspectors in submission of visa application(s) by providing all supporting document on his part and help in attaining visa through necessary correspondence with the embassy.
	20.2.5	The cost of witnessing test, pre-shipment inspection or repetition thereof by the representative(s) of Director General (Substation Engineering) NGC (which shall include visa expense, return air ticket, boarding, lodging etc. as the case may be along with a daily allowance of US$ 150/day/inspector in case of foreign inspection and Rs. 4000/day/inspector) shall be borne by the Contractor without any additional cost to the Employer. The cost of witnessing of pre-shipment inspection or repetition thereof by representative of independent inspector shall be covered by the Contractor according to agreement/ subcontract between the Contractor and independent inspector without any additional cost to the Employer.
	20.2.6	The Contractor shall keep the Employer and Project Manager informed the progress of manufacturing and notify the Project Manager at least eight (08) weeks in advance, in writing as to when the Plant or any part thereof will be ready for inspection and/or performance of type tests (if applicable in accordance with clause 4, Subsection-2 (Technical Specifications) of Section-10 (Technical Provisions).
	20.2.7	The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection. If the Employer or Project Manager or their designated representatives fails to attend the test and/or inspection, or if it is agreed between the parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a certified report of the results thereof.
	20.2.8	The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in carrying out such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of work on the Works and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.
	20.2.9	Any inspection and/or witnessing of tests or the waiving of such tests and/or surveillance by the Employer and Project Manager or their two Nos. Representatives shall not relieve the Contractor of its obligations and

	responsibilities under the Contract regardless of any approval or consent given by the Employer and Project Manager. All work covered by the Contract shall be subject to surveillance, testing and inspection by the representatives of the Employer. The Inspectors may require witnessing any or all the tests to be carried out. For such purpose the Contractor shall provide free access at all times during manufacture, assembly and testing to the premises in which the work is being carried out. 20.2.10 If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Plant or part of the Works that cannot be settled between the parties within a reasonable period of time, it may be settled in accordance with GCC Subclause 50 20.2.11 The Contractor shall afford the Employer and the Project Manager, at the Employer's expense, access at any reasonable time to any place where the Plant are being manufactured or the Works are being installed, in order to inspect the progress and the manner of manufacture or installation, provided that the Project Manager shall give the Contractor a reasonable prior notice.
	GCC Subclauses 20.3 and 20.4 are deleted in their entirety.
21.1	**Rejection** Last para of subclause is replaced with following: "The tests shall be repeated under the same terms and conditions without any additional cost to the Employer."
23.1	**Order to Suspend** Following is added at the end of subclause: "During such period, the Contractor shall not remove from the Site any Plant, any part of the thereof or any Contractor's Equipment, without the prior written consent of the Employer."
24.1	**Cost of Suspension** Following is added at the end of second para: "or for the proper execution or for the safety of the Works or Plant unless such necessity results from any act or default of the Project Manager/Engineer or the Employer or in consequence of any of the Employer's Risks under Sub-Clause 37.2."
24.4	**Resumption of Work** First paragraph of Sub-Clause 24.4 is deleted and substituted by the following: "If the Contractor chooses not to treat prolonged suspension as an omission or termination under Sub-Clause 24.3, the Employer shall, upon the request of the

	Contractor, take over the responsibility for protection, storage, security and insurance of the suspended Works and of the Plant which has been delivered to the Site and which is affected by suspension and the risk of loss or damage thereto shall thereupon pass to the Employer."
25.1	**Time for Completion** The text of Sub-Clause 25.1 is deleted and substituted by the following: "The Works at the place of the project mentioned in the Preamble to Conditions of Contract shall be completed tested and commissioned within the period mentioned in the Preamble to Conditions of Contract."
26.1	**Extension of Time for Completion** The Existing Text of the provision is deleted and replaced with the following. *The Contractor shall be entitled subject to provisions of this clause to an extension of the Time for Completion if and to the extent that completion for the purposes of Clause 25.1 is or will be delayed by any of the following causes:* *(a) a Variation (unless an adjustment to the Time for Completion has been agreed)* *(b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,* *(c) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors on the Site.* *If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with this Clause. The Engineer shall after due consultation with the Employer and the Contractor, determine the amount of such extension and shall notify the Employer and Contractor accordingly. While determining each extension of time under this Clause, the Engineer shall review previous determinations and may increase, but shall not decrease, the total extension of time.* *The Engineer shall make his determinations and notify the finalized/approved determination within reasonable time but not later than 90 days after submission of interim/final particulars by the Contractor in pursuance of this Clause as per prevalent SoPs .* **Notification Conditions for the Claims under This Clause** Provided that the Engineer is not bound to make any determination unless the Contractor has:- (a) within 28 days after such event has first arisen notified the Engineer with a Particulars copy to the Employer, and (b) within 28 days, or such other reasonable time as may be agreed by the Engineer, after such notification submitted to the Engineer detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

26.3	Earlier Completion (i) At the end of Sub-Clause 26.3(a) the following text is added and Clause is re-designated as 26.3. "The extra sum to be paid to the Contractor for Completion of Works prior to the date of Completion established under Sub-Clause 25.1 shall be computed on the basis of the sums mentioned in the Preamble to Conditions of Contract." (ii) Sub-Clause 26.3 (b) is deleted.
	Subclause GCC 26.4 is added as follows:
26.4	Rate of Progress If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Project Manager/Engineer, too slow to comply with the Time for Completion, the Project Manager/Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Project Manager/Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Project Manager/Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognized days of rest, he shall be entitled to seek the consent of the Project Manager/Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this Sub-Clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Project Manager/Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any moneys due or to become due to the Contractor and the Project Manager/Engineer shall notify the Contractor accordingly, with a copy to the Employer. In case of any delay on account of repeated/inordinate/erroneous submittals of designs/technical data as well as the repeated request for change of manufacturers, the Employer shall recover any additional costs incurred in maintaining design review/approval services for such extended period besides imposition of liquidated damages. In case of Transmission Line Contract, only two (02) manufacturers are allowed to be changed whereas for Substation Contract, upto five (05) manufacturers can be changed by the Contractor during the currency of the contract subject to any valid reasons/refusal letter from original manufacturer. However, evaluation of new proposed manufacturer will be carried out on the criteria applicable in tender document The Contractor shall submit to Engineer and Employer the daily, weekly, monthly

	progress reports and cash flow projections on the format approved by the Engineer. The monthly reports shall be submitted within 05 days from completion of the respective month. The Contractor shall make available and install 04 number of WEBCAMs alongside necessary storage of atleast 06 months and servers for continuous monitoring of site ~~(instant sites in case of T/Lines)~~ activities. The Contractor will provide access to the Engineer and Employer's designate persons. The placing/location/coverage decision for the installation of WEBCAMs will be done with consent of Engineer.
27.1	**Delay in Completion** Sub-Clause 27.1 is deleted and substituted by the following: "If the Contractor fails to deliver the Works, or any part thereof, within the time stated in Sub-Clause 25.1, or fails to complete the whole of the Work, or, if applicable, any Section within the relevant time prescribed by Sub-Clause 25.1, then the Contractor shall pay to the Employer the relevant sum mentioned in Preamble to Conditions of Contract as liquidated damages for such default (which sum shall be the only moneys due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant time for Delivery or Time for Completion and the actual date of delivery at site or the date stated in a Taking–Over Certificate of the whole of the Works or the relevant Section, as the case may be, provided that the aggregate amount of such liquidated damages shall in no event exceed the maximum amount specified as in Preamble to Conditions of Contract The Employer may deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract. The liquidated damages for each day of delay and the maximum amount of liquidated damages shall be the amounts mentioned in the Preamble to Conditions of Contract."
28.1	**Notice of Tests** The words " The Employer" at the start of subclause are deleted and substituted with following: "As soon as the Plant or any part thereof has, in the opinion of the Contractor, been completed operationally and structurally and put in a tight and clean condition as specified in the Special Provisions or Technical Provisions, excluding minor items not materially affecting the operation or safety of the Plant, the Contractor"
28.4	The Employer shall not provide any labour, materials, electricity, fuel, water, stores, apparatus and feedstock to Contractor to carry out the Tests.
28.6	**Disagreement as to Result of Tests**

	The following sentence is added at the end of subclause. "The parties shall then proceed in accordance with the procedure set out in GCC Clause 50."
28.7	**Consequences of Failure to Pass Tests on Completion** The words "by arbitration" appearing at the end of the Sub-Clause 28.7(c) are deleted and substituted by the words "by the Project Manager/ Engineer".
30.1	**Defect Liability Period.** Following text is hereby included and end of existing Clause The critical components covered under the extended defect liability period are [Auto-transformers, Circuit Breakers, Disconnectors, Surge Arrestors, CT's, VT's, Substation Automation System and Protection & Control Equipment …….]. The extended defect liability period for these equipment shall be 24 months after expiry of original Defect Liability period specified in this Clause .
30.4	**Extension of Defects Liability Period** At the end of 4th paragraph of Sub-Clause the following is added: "or a mutually agreed period."
30.5	**Failure to Remedy Defects** In first line after the words "reasonable time" the following is added: "fixed by the Project Manager/ Engineer".
30.11	The following text is inserted at end of this provision However, the issuance of Defect Liability Certificate can be withheld by the Project Manager/Engineer if Contractor fails to submit completion report along with As built data/drawings, material reconciliation reports, Operation & Maintenance manuals and Hard and Soft Copies of site records/data to the Engineer for information and approval prior to expiry of Defect Liability Period.
30.13	New Sub-Clause 30.13 is added as herein below: **Unfulfilled Obligations** "After the Defects Liability Certificate has been issued, the Contractor and the Employer shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force."
31.1	**Engineer's Right to Vary**

	The following is added at the end of second paragraph: "No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 31. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of Contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor."
31.5	**Record of Costs** The word "Engineer" in 4th line of Sub-Clause is deleted and substituted by "Project Manager/ Engineer/ Employer".
	New Sub-Clauses 31.6 is added as given below:
31.6	**Value Engineering** The Contractor may, at any time, submit to the Project Manager/Engineer a written proposal which in the Contractor's opinion will reduce the cost of constructing, maintaining or operating the works, or improve the efficiency or value to the Employer of the completed Works or otherwise be of benefit to the Employer. Any such proposal shall be prepared at the cost of the Contractor. However Employer is not bound to accept such proposal.
32.1	**Ownership of Plant** Subclause GCC 32.1 is replaced with following: "32.1.1 Ownership of the Plant (including spare parts) to be imported into Pakistan shall be transferred to the Employer upon loading on to the mode of transport to be used to convey the Plant from the country of origin to that country. 32.1.2 Ownership of the Plant (including spare parts) procured in Pakistan shall be transferred to the Employer when the Plant are brought on to the Site. 32.1.3 Ownership of the Contractor's Equipment used by the Contractor and its Subcontractors in connection with the Contract shall remain with the Contractor or its Subcontractors. 32.1.4 Ownership of any Plant in excess of the requirements for the Works shall revert to the Contractor upon Completion of the Works or at such earlier time when the Employer and the Contractor agree that the Plant in question are no longer required for the Works. 32.1.5 Notwithstanding the transfer of ownership of the Plant, the responsibility for care and custody thereof together with the risk of loss or damage thereto shall remain with the Contractor until Risk Transfer Date of the Works or the part thereof in which such Plant are incorporated."
33.1	**Terms of Payment**

33.1.1 The Employer shall pay the Contractor in the following manner and at the following times, on the basis of the Price Breakdown given in the section on Schedules of Price. Payments will be made in the currencies quoted by the Bidder unless otherwise agreed between the parties. Applications for payment in respect of part deliveries may be made by the Contractor as work proceeds.

(A) Terms of Payment

(i) Plant, Equipment and Spare parts Supplied from Abroad

In respect of plant and equipment supplied from abroad, the following payments shall be made:

i. **Advance Payment:** 10% of the total CIP Amount as an advance payment will be paid through LC upon presentation of following documents;

a) Commercial invoice to be submitted within a week of L/C opening

b) Acceptance of advance Payment Bank Guarantee issued by applicant (NGC).

[Note: The process for opening of Letter of Credit and release of advance payment will be completed within 90 days from signing of Contract (provided the timelines on Contractor's part are adhered).]

ii. **On Shipment**: 79% of the CIP amount, price of goods shall be paid upon shipment and presentation of the following documents;

a) Original and three copies of the Supplier's invoice showing Goods description, quantity, unit price and total amount.

b) Three original and three copies of the negotiable clean, on board bill of landing marked "Freight prepaid" and three copies of nonnegotiable bill of landing.

c) Original and three copies of the Packing list identifying contents of each package.

d) Insurance Policy "The supplier must insure the goods in an amount equal to 110% of CIP price of the goods from warehouse to warehouse on all risks basis".

e) Manufacturer's or Supplier's warranty certificate.

f) Inspection certificate, issued by the nominated inspector(s).

g) Certificate of origin issue by the chamber of commerce.

h) Certificate that goods are new and not of used or second hand condition.

i) Notice to deliver issued by NGC (if applicable).

iii. **On Delivery:** 01% of the LC amount (the difference of CIP &CIF) price

	of goods shall be paid upon delivery of material at site and upon presentation of the following documents; a) Commercial Invoice. b) Delivery Note signed by the applicant or its representative. iv. **On Acceptance:** 05% of the total CIP amount as balance payment will be paid through LC upon presentation of the following documents; a) Commercial Invoice. b) Project Completion Certificate issued by NGC. v. **On Acceptance:** 05% of the total CIP amount as balance payment will be paid through LC upon presentation of the following documents; a) Commercial Invoice. b) Project Operational Acceptance Certificate issued by NGC. **(ii) Plant, Equipment and Spare parts Supplied from within the Employer's Country** In respect of plant and equipment supplied from within the Employer's country, the following payments shall be made: Ten percent (10%) of the total EXW amount as an advance payment against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. Eighty percent (80%) of the total or pro rata EXW amount within forty-five (45) days after receipt of invoice for Goods upon submission of documents as specified in Clause 33.2 (3) of the Particular Conditions of Contract, duly verified by the Engineer and Employer. Hundred percent (100%) of the total Inland Transportation amount (i.e. specified in Sch-2) will be made upon delivery of the Goods to the Project's site within forty-five (45) days after receipt of invoice for Goods upon submission of documents as specified in Clause 33.2 (5) of the Particular Conditions of Contract, duly verified by the Engineer and Employer. Five percent (5%) of the total or pro rata EXW amount upon issue of the Completion/Taking Over Certificate, within forty-five (45) days after receipt of invoice and Five Percent (5%) upon completion of defect-liability Period. **(iii) Design Services** In respect of design services for both the foreign currency and the local currency portions, the following payments shall be made: Ninety percent (90%) of the total or pro rata value of design services performed by the Contractor as evidenced by the acceptance of design by Project Manager/ Engineer, within forty-five (45) days after receipt of

invoice and ten percent (10%) upon completion of defect-liability period.

(iv) Civil Works and Installation of Plant & Other Services

In respect of civil works and installation services, the following payments shall be made:

Ten percent (10%) of the total value of civil works and installation services as an advance payment within thirty (30) days against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer.

Eighty percent (80%) of the measured value of work performed by the Contractor, as identified in the said Program of Performance, during the preceding month, as evidenced by the Employer's authorization of the Contractor's application, will be made monthly within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata value of civil works and installation services performed by the Contractor as evidenced by the Employer's authorization of the Contractor's monthly applications, upon issue of the Completion Certificate, within forty-five (45) days after receipt of invoice and five percent (5%) upon completion of defect-liability period.

(vi) Reimbursement of Duties, Indirect Taxes, and other local charges

For any sum expended by the contractor in respect of custom duties and local indirect taxes shall be paid by the Employer within 45 days against submission of claim supported by documentary evidence acceptable to employer. The reimbursement of taxes will only be made if NGC's WEBOC system is used.

All payments will be subject to withholding taxes as per Income Ordinance, 2001/ International Tax Treaty & Sales Tax Act 1990. Further, payments shall be made only to those entities appearing in Active Taxpayer List (ATL) for both Income Tax & Sales Tax.

(B) Payment Procedures

The procedures to be followed in applying for certification and making payments shall be as follows:

Summary of Procedure

Sr. #	Item	Procedure
1	Plant & Spare parts from	Letter Of Credit/Direct

	outside Pakistan	Payment*
2	Plant & Spare parts from within Pakistan	Direct Payment
3	Design services	Letter Of Credit/Direct Payment*
4	Civil Works	Direct Payment
5	Installation, Erection, Testing & Commissioning	Direct Payment
6	Custom Duties and taxes (on Imported items)	Paid by Contractor and reimbursed by Employer
7	Sales tax (local items & services)	Paid by Contractor and reimbursed by Employer
8	Local transportation	Direct Payment

* **Foreign Contractor** shall be paid by the Employer through irrevocable Letter of Credit opened in favour of the Contractor in a bank in its country, upon submission of documents specified herein.

Local Contractor shall be paid foreign currency component through inland letter of credit opened in favour of contractor in equivalent Pak Rs on parity rate (interbank TT selling) prevailing on the date of Bill of Lading. The date of bill of Lading should fall within the proposed schedule of delivery updated at the time of contract as per committed completion period. For Local currency component, local Contractor shall be paid through direct payment.

(i) Charges for opening of Letter of Credit and amendments shall be borne by the Contractor. The currency of LC shall be the same as quoted in the bid.

(ii) Irrevocable Letter of Credit will be established by CFO (NGC), 2nd Floor, Shaheen Complex, Egerton Road, Lahore within Seventy Five (75) days from the date of signing of Contract in any scheduled bank in Pakistan in favor of Contractor in a designated bank in his country. The timeline for the establishment of L/C will be as under:-

• Within 15 days from issuance of Notification of Award/Letter of Acceptance, the Contractor will submit the following information to the Chief Financial Officer (NGC), Attention: Deputy Manager (L/C), 2nd Floor, Shaheen Complex, Egerton Road, Lahore under intimation to the Procuring Agency:

a. Signed and Stamped Copy of Notification of Award.
b. Name & Complete address of Beneficiary.
c. Name & complete address of Beneficiary Bank.
d. Beneficiary's Bank Account Number & Swift Code.
e. Proforma Invoice in original duly signed/stamped including relevant

payment terms. (Draft Proforma Invoice is attached as Form-19)

f. Freight Breakup.
g. No. of Packages.
h. Weight and Measurement of goods.
i. Port of Shipment.
j. Volume.
k. Expected Date of Shipment.
l. Origin of Goods.
m. Delivery Period.
n. Relevant H.S Codes to be incorporated in the L/C
o. Insurance Cover (if applicable)

(any other documents required by the L/C focal person –DM (L/C) NGC)

- Draft LC from bank will be provided to Procuring Agency and Contractor by LC section within 07 days.

- Draft will be got vetted from Contractor within 07 days, otherwise it will be considered as deemed approved. In this case, LC section will proceed for opening of LC as per Contract Agreement. Any amendment thereof shall be borne by the supplier.

(iii) The Contractor shall pay the custom duties and other incidental charges through Manager (Custom Clearance & Logistics) NGC, Karachi. The same shall be reimbursed to the Contractor as per actual.

The Contractor will coordinate with Manager (Custom Clearance & Logistics) NGC, Karachi for custom clearance and will be responsible and pay the charges for unloading and loading at sea port, inland transportation and insurance to the site/Employer ware house, storage at site and insurance. For purpose of clearance of material at port, the Contractor shall hire services of any NGC authorized clearing agent (appearing in NGC authorized agents list)

(iii) Upon shipment of Plant from outside Pakistan, the contractor shall notify the Employer, Manager (Custom Clearance & Logistics) NGC, Karachi, Pakistan and the Insurance Company by fax/cable the full details of the shipment, including Contract number, description of Goods, quantity, the vessel, the bill of lading number and date, port of loading, date of shipment, port of discharge, etc. The Contractor shall mail the following documents to the Employer and Manager (Custom Clearance & Logistics) NGC, Karachi with a copy to the Insurance Company, in such a manner that the same are received by all concerned at least **15 days** before arrival of the Plant at the port or place of arrival. The Contractor will be responsible for any consequent expenses due to late receipt of the said documents.

a) Copies of the Contractor's invoice showing Goods description, quantity,

unit price and total amount.

b) Original and four copies of the negotiable clean, on board bill of lading marked "freight prepaid" and four copies of non-negotiable bill of lading.

c) Copies of the packing list identifying contents of each package.

d) Insurance certificate.

e) Manufacturer's or Supplier's Warranty certificate.

f) Inspection certificate, issued by the nominated inspection agency and the manufacturer's factory inspection report, alongwith manufacturer's Warranty certificate.

g) Certificate of origin.

(iv) For any sum paid by the Contractor in respect of custom duties and taxes in consequence of importation of Plant, shall be reimbursed by the Employer within the time mentioned in GCC Subclause 33.5 against presentation of acceptable claim supported by documentary evidence in original to the Employer. The expenses against this item shall be reimbursed from the amount of Provisional Sums provided in Schedule of Price No. 5 Grand Summary for this purpose."

33.1.2 Retention of Payment

If at any time any payment would fall due for Works or part of Works and, if there shall be any defect in part of such Works in respect of which such payment is proposed, the Employer may retain the whole or any part of such payment. Any sum retained by the Employer pursuant to the provisions of this Clause shall be paid to the Contractor after the said defect is removed.

33.1.3 Payment Where Taking-Over Certificate Issued for Section or Part of Works

If any section or part of the Works shall be taken-over separately under Clause 29 (Taking-Over) hereof, the payments herein provided for on or after Taking-Over shall be made in respect of the section or part taken-over and reference to the price shall mean such part of the price as shall, in the absence of agreement, be apportioned thereto by the Project Manager/Engineer.

33.1.4 Extra Payment

No extra payment in respect of overtime, additional materials, or special conditions or hardship shall be claimed by the Contractor unless otherwise provided in the Contract or such payments have been previously authorized in writing by the Project Manager/Engineer or the Employer.

	33.1.5 Breakdown of Lump Sum Items For the purposes of statements to be submitted in accordance with Sub-Clause 33.1 hereof, the Contractor shall submit to the Project Manager/Engineer, within twenty eight (28) days after the receipt of the Letter of Acceptance, a breakdown for each of the lump sum items contained in the Bid. Such breakdowns shall be subject to the approval of the Project Manager/Engineer.
33.2	**Method of Application** Sub-Clause 33.2 is deleted and substituted by the following: (1) The Contractor shall submit to the Employer/Project Manager/Engineer ten (10) copies of the Application for Certificate of Payment (invoices) each signed by the Contractor and in such form as the Employer/Project Manager/Engineer may from time to time prescribe. Application shall be accompanied by such invoices, receipts or other documentary evidence as the Engineer/Project Manager may from time to time require. (2) The Application for Certificate of Payment for progress of Work under Schedule of Price No. 4 shall be submitted after end of each month accompanying also a statement signed by the Contractor in the form acceptable to Employer or in such other form as the Engineer may from time to time prescribe showing the amounts to which the Contractor may consider himself to be entitled upto the end of the month in respect of: i. The permanent work executed. ii. Payment of account of lump sum item in the Price Schedule not included under head (i) above. (3) The Applications for Certificate of Payment for supply of Goods (Schedule of Price Nos. 1 &2) shall be submitted on the delivery of any Goods and shall also be accompanied by the following documents: a) Shipping Documents comprising of i) Payment/Commercial Invoice ii) Clean on board Bill of Lading or airway bill issued by the freight forwarder (for imported Goods only) iii) Delivery Note/Acknowledgement of the material receipt at site or at Employer designated Warehouses in case of Spare Parts iv) Packing list v) Certificate or Policy of Freight Insurance from Ex- factory to the Project Site or to Employer designated Warehouses in case of Spare Parts, of the portion of the Goods for which Certificate of Payment is requested b) Certificate that the Goods complies with the Specifications c) Certificate of origin, issued by the Contractor d) Warranty Certificate e) Pre-shipment Inspection certificate/Inspection certificate or letter of waiver, issued by the Engineer.

	f) Any other document as considered necessary by the Engineer (4) The Application for Certificate of Payment shall state the amount claimed and shall set forth in detail, in the order of the Price Schedule, particulars of the Work executed up to the date named in the Application and subsequent to the period covered by the last preceding certificate, if any. (5) Any payment claims for Foreign Exchange part under Clause GCC 47.1 will be paid through direct payment procedure (Crossed Cheque) in equivalent PKR as per exchange rate applicable on date of payment.
33.5	**Payment** Sub-Clause 33.5 is deleted and substituted by the following: "The amount due to the Contractor under any Interim Payment Certificate issued by the Project Manager/Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 27, be paid by the Employer to the Contractor within the period mentioned in Preamble to Conditions of Contract after such Interim Payment Certificate has been jointly verified by Employer and Contractor, or, in the case of the Final Certificate (referred to in Sub-Clause 33.10) within the period mentioned in Preamble to Conditions of Contract after such Final Payment Certificate has been jointly verified by Employer and Contractor. Deduction shall be made from the net amounts payable to the Contractor of any sum(s) in accordance with the prevalent Federal and/or Provincial laws, provided that no such deduction shall be made from those payments in respect of which the Contractor has obtained exemption under the Law."
33.8	**Payment by Measurement** Actual quantities of civil works shall be finalized upon completion of final substation layout/orientation, and approval of civil works drawings. **Work to be measured** The Employer / Project Manager, shall, except as otherwise stated, ascertain and determine by measurement the value of the work done in accordance with the Contract and the Contractor shall be paid that value in accordance with this Clause. The Employer / Project Manager shall, when he requires any part of the Work to be measured, give reasonable notice to the Contractor, who shall: (a) forthwith attend or send a qualified representative to assist the Employer / Project Manager in making such measurement, and (b) supply all particulars required by the Employer/ Project Manager Should the Contractor not attend, or neglect or omit to send such representative, then

	the measurement made by the Employer/ Project Manager or approved by him shall be taken to be the correct measurement of such part of the Work. For the purpose of measuring such Work as are to be measured by records (including video records from WEBCAMs) and drawings, the Employer/ Project Manager shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within fourteen (14) days, attend to examine and agree such records and drawings with the Employer/ Project Manager and shall sign the same when so agreed. If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. if, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within fourteen (14) days of such examination, lodges with the Employer/ Project Manager notice of the respect in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Employer/ Project Manager shall review the records and drawings and either confirm or vary them. **Method of Measurement** The Work shall be measured net, notwithstanding any general or local custom, expect where otherwise provided for the Contract.
	Sub-Clause 33.12 Withholding of Payment New Sub-Clause 33.12 is added as given below: If the Works or any parts thereof are not being carried out to the Project Manager/Engineer's satisfaction and in order to protect the Employer from loss on account of: (a) defective work not rectified (b) claims filed against the Contractor (c) failure of the Contractor to make payments due for Plant procured or labour employed by him (d) damage to any other contractor employed by the Employer (e) Contractor's non–compliance with the Contract (f) any Government dues recoverable from the Contractor if notified by the Government (g) Any other reason as deemed necessary by the Employer, for substantiation of invoice. The Project Manager/Engineer may notify withholding of such payments or part thereof as may, in his opinion, be related to the aforesaid reasons/grounds. When the reasons/grounds for withholding the payment are removed by the Contractor, the Project Manager/Engineer shall upon being satisfied to that effect issue Certificate of Payment in respect of withheld amounts without markup and penalty. In addition, the Employer/Engineer reserves right to withhold Contractor’s payment

	on following accounts. a) Notwithstanding the terms of Clause 33.1 or any other Clause of the Contract, no amount will be certified by the Engineer for payment/paid by Employer until the Performance Security/Advance Payment Security, if required under the Contract, has been provided by the Contractor, approved by the Employer and is valid for the required duration stated in the Contract. b) Employer reserves the right to withhold the payments in case of Contractor's non-compliance with reporting requirements under Clause-26.4 and insurance requirements under Clause 43 of Conditions of Contract. c) If there is any ambiguity in the payment/claim or Interim Payment Certificate, the Employer may withheld the payment to such extent and may process the remaining amount. In such case, the withheld amount may be included in the next Payment Certificate alongwith clarification for ambiguity pointed out by Employer. d) In case of Contractor's non-compliance with the laws/regulations of the tax authorities' (Federal/Provincial), the Employer reserves the right to withhold the payments for ensuring the necessary compliance. e) In case the Engineer determines that the Contractor do not possess sufficient T&P as per requirements of works/tender documents, He has right to withhold the payments. Any delay in payments due to aforementioned provisions do not give any right to Contractor for Remedies under Clause 26.1 and 33.7.
	<u>Subclauses GCC 33.13 and GCC 33.14 are added as follows:</u>
33.13	No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the Works or any part(s) thereof.
33.14	**Payments Due from Contractor for non- compliance** Employer may, without prejudice to any other method of recovery, deduct the amount due from any money is his hand due to or which may become due to the Contractor or recover same through the Performance Security as per the provisions of the contract. . Such deduction shall not relieve the Contractor from his obligations to complete the Work in accordance with the Contract to the satisfaction of the Employer.
35.2	**<u>Currency Restrictions</u>** The text of Sub-Clause 35.2 is deleted and substituted by the following: "Any required foreign currency transactions shall be met by the Contractor at his cost

	from his own resources."
35.3	**Rates of Exchange** The text of Sub-Clause 35.3 is deleted and substituted by the following: "Any import, if required and approved by the Employer shall also be paid in local currency with exchange rate for the period as notified by the National Bank of Pakistan."
36.4	**Payment against Provisional Sums** Sub-Clause 36.4 is deleted and substituted by the following: "Provisional Sum if any will be expended on the direction of the Engineer through Variation Orders which would be valued in accordance with the provisions of Clause 31 Conditions of Contract."
37.2	**Employer's Risks** The text of Sub-Clause 37.2 is deleted and substituted by the following: "The Employer's Risks are: (a) (Insofar as they relate to Pakistan) war and hostilities (whether war be declared or not), invasion, act of foreign enemies (b) (Insofar as they relate to Pakistan) rebellion, revolution, insurrection, military or usurped power or civil war (c) ionizing radiation or contamination by radioactivity from any nuclear fuel, radio-active toxic explosives or other hazardous properties of any explosive nuclear assembly or nuclear components thereof (d) pressure waves caused by aircraft travelling at sonic or supersonic speed (e) (Insofar as they relate to Pakistan) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors (f) use or occupation of the Work or any part thereof by the Employer (g) fault, error, defect or omission in the design of any part of the Works by the Engineer, Employer or those for whom the Employer is responsible for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of such design

	(h) the use or occupation of the Site by the Works or any part thereof, or for the purposes of the Contract: or interference, whether temporary or permanent with any right of way, light, air or water or with any easement, way leaves or right of a similar nature which is the inevitable result of the construction of the Works in accordance with the Contract (i) the right of the Employer to construct the Works or any part thereof on, over, under, in or through any land (j) damage (other than that resulting from the Contractor's method of construction) which is the inevitable result of the construction of the Works in accordance with the Contract (k) the act, neglect or omission or breach of contract or of statutory duty of the Engineer, the Employer or other contractors engaged by the Employer or of their respective employees or agents."
39.2	**Loss or Damage Before Risk Transfer Date** The words "by arbitration under Clause 50" are deleted and substituted by the words "by the Project Manager/ Engineer".
39.4	New Sub-Clause 39.4 is added as given below: **Duty to Minimize Delay** Each Party shall at all times use all reasonable endeavors to minimize any delay in the Performance of the Contract as a result of Risks. The Contractor shall give notice to the Employer and vice versa the Employer shall give notice to the Contractor in case of foreseeable delay by the Risks.
40.1	**Contractor's Liability** The text of Sub-Clause 40.1 is deleted and substituted by the following: 40.1.1 Except as provided under Sub-Clause 41.1, the Contractor shall be liable for and shall indemnify the Employer against all losses, expenses and claims in respect of any loss of or damage to physical property (other than the Works), death or personal injury occurring before the issue of the last Defects Liability Certificate to the extent caused by: (a) defective design, material or workmanship of the Contractor, or (b) negligence or breach of statutory duty of the Contractor, his

	Subcontractors or their respective employees and agents. 40.1.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GCC Subclause 40.1.1, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Contractor fails to notify the Employer within 28 days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the 28-day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.
40.2	**Employer's Liability** The text of Sub-Clause 40.2 from the words "or of death or personal injury" to the end of the Sub-Clause, is deleted and substituted by the following: "..... (other than the Works) or of death or personal injury to the extent caused by any of the Employer's Risks listed in paragraphs (f), (g), (h), (i), (j), and (k) of Sub-Clause 37.2 but not otherwise."
42.1	**Limitations of Liability** Following Subclause 42.1 (c) is added at the end of GCC 42.1: "(c) in case of criminal negligence or willful misconduct."
42.2	**Maximum Liability** the words "the sum stated in the Preamble to Conditions of Contract or if no such sum is stated" appearing in 2nd line of Sub-Clause are deleted.
42.6	**Foreseen Damage** Sub-Clause 42.6 is deleted in its entirety.
	Subclause 43.0 is added under the heading "**Insurance**" as follows: 43.0.1 To the extent specified herein, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect,

	during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified herein. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval. 43.0.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to this clause, except for the Third Party Liability, Employees, and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to this Clause except for the Marine Insurance of Plant and Employees. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies 43.0.3 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Contractor.
43.1.1	<u>The following further Sub-Clauses are 43.1.1, 43.1.2 and 43.1.3 are added:</u> **<u>Marine Insurance of Plant</u>** (1) The Contractor shall in the joint names of the Contractor and the Employer, obtain Marine Cargo All Risks Insurance to cover loss or damage to the Plant or part thereof during transport. (2) The insurance for each consignment of Plant or part thereof shall attach from the time the Plant or part thereof leave the warehouse or place of storage and terminate after ninety (90) days on its completion of unloading at the Site or until insurance survey whichever occurs first. Upon arrival of each consignment at the Site, the Contractor shall, immediately arrange insurance survey by the insurance company. (3) The sum insured for imported Plant or part thereof shall be for its full replacement value at the Site i.e. 100 % CIP value at the Site for each consignment of the Plant or part thereof plus not less than 30 % of CIP value at the Site to cover any additional costs resulting from loss or damage thereof. (4) The Insurance Policy for imported Plant etc. shall be on "All Risks" basis and shall not be limited to the attachment/endorsement of following clauses: (a) Institute Cargo Clauses (A) (b) Institute War Clauses (Cargo)

	(c) Institute Strikes Clauses (Cargo) (d) Institute Cargo Clauses (Air) excluding sending by Post (e) Institute War Clauses (Air Cargo) excluding sending by Post. (f) Institute Strikes Clauses (Air Cargo) (g) Special Replacement Clauses (Air) (h) Institute Theft, Pilferage and Non-delivery Clauses
43.1.2	**Erection/Construction All Risks Insurance** (1) The Contractor shall insure the Works or part thereof in the joint names of the Contractor and the Employer. (a) from the date following the completion of the first unloading at the Site of the Plant or part thereof and other materials (to be used for construction or erection) and from commencement of Works at Site until the Risk Transfer Date against any loss or damage caused by any of the Contractor's risks and any other risks specified in Sub-Clause 43.1.(a) above and (b) during the Defects Liability Period against any loss or damage which is caused either: (i) by the Contractor in completing any outstanding work or complying with his obligations under Clause 30, or (ii) by any of the Contractor's risks and any other risks specified in Sub-Clause 43.1(a) above, which occurred prior to the Risk Transfer Date. (2) The sum insured shall be the full replacement value at the Site, which includes: (a) (i) FOB value of imported Plant to be erected (ii) Ex-factory value of Indigenous Plant to be erected, if any (b) freight and insurance including local transport (c) customs duties and taxes etc. (d) cost of erection (e) cost of civil engineering work including escalation (f) clearance of debris, maximum @ 5 % of minimum amount of Third Party Liability Insurance

	Plus 30% to cover any additional costs resulting from loss or damage thereof.
43.1.3	**General** Should a loss be sustained, the Contractor shall replace or repair any loss or damage at his own cost and complete the Works in accordance with the Contract as soon as possible after occurrence of such loss or damages, without waiting for the settlement of the insurance claim."
43.2	**Contractor's Equipment** Sub-Clause 43.2 is deleted and substituted by the following: "The Contractor shall insure the Contractor's Equipment for its full replacement value while on the Site against all loss or damage caused by any of the Contractor's Risks."
43.7	**Remedies on the Contractor's Failure to Insure** In 3rd line after the word, "purpose", the expressions- "and reasonable costs including the man-hours costs of Employer's Personnel" are added.
43.9	New Sub-Clauses 43.9 to 43.12 are added as follows: **Currency of Insurance** "All policies of Insurance of the Plant shall provide for payment of indemnity to be made in such amounts as will allow making good of loss of or damage to the whole or any part of the Works preferably PKR."
43.10	**Contractor to Notify** "It shall be the duty of the Contractor to notify the insurers of any such insurances referred to above of any matter or event which by the terms of such insurances are required to be so notified. All formalities in connection with insurance survey(s) shall be the sole responsibility of the Contractor. The Contractor shall indemnify and keep indemnified Employer against all loss, claims, demands, proceedings, costs, charges and expenses whatsoever arising out of or resulting from any default by the Contractor in complying with the requirements of this Sub-Clause whether as a result of the avoidance of any such insurance or otherwise. In case of any insurance claim, the Contractor shall pursue the insurance claim if any, till such time final settlement of such insurance claims is effected."
43.11	**Procurement of Insurance Policies** The Contractor shall procure and submit the insurance cover before Date of

	Commencement. Further, in case of delay, the Employer reserves the right to procure the insurance policies at risk and cost of the Contractor. In case of loss incurred during absence of insurance cover, the Contractor shall be fully responsible to indemnify the Employer from any such event as per sums which would have otherwise been recoverable from insurance cover.
43.12	**Insurance Company** All insurances shall be affected with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.
44.1	**Force Majeure** The words "and which are unavoidable notwithstanding the reasonable care of the party affected," are added in the first line after the word "the parties". Text in sub-para (b) is deleted and para (c) and (d) are re-numbered as (b) and (c).
44.6	**Damage Caused by Force Majeure** At the end of the Sub-Clause 44.6 the following is added: "However the Contractor shall put up his claim to the Employer / Engineer with full details and justification."
44.8	**Payment on Termination for Force Majeure** Text in sub-para (c) is deleted and para (d) and (e) are re-numbered as (c) and (d). New Sub-para (e) shall be added as follows: In calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to clause 33.1 (Terms of payment) of the contract agreement
44.10	**Force Majeure Affecting Engineer's Duties** Sub-Clause 44.10 is deleted in its entirety.
45.2	**Contractor's Default** Text of subclause is numbered as sub-para 45.2.1 and the following sub-para 45.2.2 is added:
45.2.2	Upon receipt of the notice of termination under GCC Subclauses 45.2.1 or 42.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

	(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Works already executed, or any work required to leave the Site in a clean and safe condition; (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) below; (c) deliver to the Employer the parts of the Works executed by the Contractor up to the date of termination; (d) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Works and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors; and (e) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Works. The Employer or such other contractor may use for such completion any Contractor's Equipment which is upon the Site as he or they may think proper, and the Employer shall pay the Contractor a reasonable compensation for such use.
45.4	**Payment after Termination** The text of subclause is replaced with following: "The Employer shall not be liable to make any further payments to the Contractor until the Works have been completed. When the Works are so complete, the Project Manager/Engineer shall certify the total cost of such completion of Works. The Employer may recover the extra cost of such completion, as certified by the Project Manager/Engineer, from any sums otherwise due and payable to the Contractor and/or by disposing of the Contractor's Equipment and stores taken over by the Employer under this Clause or as otherwise provided by law. If there is no such extra cost the Employer shall pay any balance due to the Contractor." In calculating extra cost of such completion, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to clause 33.1 (Terms of payment) of the contract agreement.
	New Sub-Clause 45.6 is added as follows:
45.6	**Integrity Pact** If the Contractor, or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Schedule-J to his Bid, then the Employer shall be entitled to: (a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;

<table>
<tr><td></td><td>(b) terminate the Contract; and
(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 45.2 to 45.5 and the payment under Sub-Clause 45.4 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.</td></tr>
<tr><td>46.1</td><td><u>Employer's Default</u>

The comma and the word “or” at the end of paragraph (d) of Sub-Clause 46.1 are deleted and substituted by period (.) Paragraph (e) of Sub-Clause 46.1 is deleted.</td></tr>
<tr><td>46.3</td><td><u>Payment on Termination for Employer's Default</u>

The words “including loss of profit” in the second paragraph of Sub-Clause 46.3 are deleted.</td></tr>
<tr><td>47.1</td><td><u>The title and text of subclause are deleted and substituted with following:</u>
(The formula/guidelines issued by Pakistan Engineering Council (PEC) (attached as annexure-) in May 2022 and or any latest version issued by PEC shall be applicable.)

If the currency in which Contract Price is expressed is different from the currency of the country of origin of the materials indices, a correction factor shall correspond to the ratio of exchange rates between two currencies on the date for adjustment and base date as defined above.

<u>Any price adjustment claims against the subject Clause will be paid to the EPC Contractor in Pakistan in equivalent Pak Rupees on the date of payment in Pakistan.</u>

A. <u>Moreover, the indices for the price adjustment formula for Civil Works are as under:</u>

The source of indices and the weightages or coefficients for use in the adjustment formula for Civil Works shall be as follows:

<table>
<tr><th>Cost Element[1]</th><th>Description</th><th>Weightages1</th><th>Applicable Index</th></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>(i)</td><td>Fixed Portion (A)</td><td>0.25</td><td>-</td></tr>
</table>
</td></tr>
</table>

(ii)	Local Labor per day Unskilled Labor (UL): Skilled Labor (L) :	0.15 (b) 0.10 (c)	Government of Pakistan (GoP), Pakistan Bureau of Statistics (PBS) Monthly Bulletin of Statistics -Intercity Consumer Prices for unskilled labor for Islamabad city[2] -Intercity Consumer Prices for skilled labor for Islamabad city[2]
(iii)	Cement (C): Ordinary Portland Cement (OPC) per metric ton representing all types of cement used in the Works	0.14 (d)	Government of Pakistan (GoP), Pakistan Bureau of Statistics (PBS) Monthly Bulletin of Statistics -Intercity Wholesale Prices of selected commodities for Islamabad city[2]
(iv)	Reinforcing Steel Bars (S): ½ inch dia round MS bars per metric ton representing all types and dimensions of Steel Reinforcement used in the Works	0.18 (e)	Government of Pakistan (GoP), Pakistan Bureau of Statistics (PBS) Monthly Bulletin of Statistics -Intercity Wholesale Prices of Selected Commodities for Islamabad city[2]
(v)	High Speed Diesel (HSD) per liter (D)	0.13 (f)	Retail Sale Price as notified by Pakistan State Oil (PSO) Limited on its website
(vi)	Altron Premium per liter (P)	0.05 (g)	Retail Sale Price as notified by Pakistan State Oil (PSO) Limited on its website
	Total	1.00	

Notes:

1. The base cost indices or prices shall be those prevailing on 28 days prior to the latest date for submission of Bids. Current (Revised) Indices or Prices shall be those prevailing on 28 days prior to the last day of billing month.
2. Any fluctuation in the indices or prices of materials other than those given above shall not be subject to adjustment of the Contract Price.

B. Price Adjustment Formula for Material Schedule Nos.1 and 2 (Plant and Mandatory Spare Parts) of Price Schedules

Prices Payable to the Contractor, in accordance with the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of material components, in accordance with

the following formula:

The Contract Price shall be adjusted for the local/foreign currency prices of only the following equipment stated in Schedule No.1 (Plant and Mandatory Spare Parts Supplied From Abroad) and Schedule No.2 (Plant and Mandatory Spare Parts Supplied from within the Employer's Country) of the Price Schedules for any increase or decrease in the costs:

(a) Transformers (Auto transformers)
(b) Gantries and equipment support structures.
(c) High Voltage Bus work, stranded & tubular conductors
(d) Grounding system, control and small power cables.

No increase in the price of each of the above mentioned components will be allowed beyond the scheduled delivery/ shipment period of the respective Plant if the price increase is because of reasons attributable to the Contractor, provided that the extension is granted pursuant to GCC Clause 40. The Employer will, however, be entitled to any price decrease occurring during such period of delays. No price adjustment shall be payable on the portion of the Contract Price paid to the Contractor as an advance payment. Each claim shall be supported with documentary evidences to the satisfaction of the Employer and the Project Manager.

Transformers (Auto Transformers)

Increase or decrease in the Price of Auto Transformers payable by Employer to the Contractor shall be calculated on the basis of the following formula:

$$P_1 = 0.9 \times \left(P_T \times \left(0.5 + 0.25 \frac{Cu_1}{Cu_0} + 0.15 \frac{Si_1}{Si_0} + 0.1 \frac{MS_1}{MS_0} \right) - P_T \right)$$

where

P_1	=	Adjustment in Price payable to the Contractor
P_T	=	Contract Price of the Transformers i.e. base Price
Cu_0	=	Copper index as per London Metal Exchange (LME) prevailing twenty eight (28) days prior to Bid Opening Date
Cu_1	=	Copper index as per London Metal Exchange (LME) prevailing on the date of adjustment.
Si_0	=	Silicon Steel index based on the rate on international Manufacturer i.e. M/s Nippon, Japan or M/s Kawasaki, Japan or M/s Thyssen Krupp, Germany or any other equivalent source prevailing twenty eight (28) days prior to Bid Opening Date
Si_1	=	Silicon Steel index based on the rate on international Manufacturer i.e. M/s Nippon, Japan or M/s Kawasaki, Japan or M/s Thyssen Krupp, Germany or any other equivalent source prevailing on the date of adjustment.
MS_0	=	Hot rolled mild Steel thick plate (used in transformer) index in the country of Employer or any other equivalent source prevailing twenty eight (28) days prior to Bid Opening Date
MS_1	=	Hot rolled mild Steel thick plate (used in transformer) index in the country of Employer or any other equivalent source prevailing on the date of adjustment.

Gantries and equipment support structures

Only Price of Steel component shall be adjustable in price of Gantries and steel supporting structures. Increase or decrease in the Price of gantries and equipment supporting structures payable by Employer

to the Contractor shall be calculated on the basis of the following formula:

$$P_1 = 0.9 \times (R - B) \times W$$

Where

P_1 = Adjustment in Price Steel for Gantries and equipment support structures.

B = is the basic rate of steel (US$/PKR per Metric Ton) prevailing twenty eight (28) days prior to the date of Bid Opening based on Pakistan Steel Mill (PSM) Billet rate/London Metal Exchange (LME) cash official (whichever is applicable) for all grades of steel.

R = is the revised rate of steel (US$/PKR per Metric Ton) prevailing twenty eight (28) days after the release of Advance Payment, based on PSM Billet rate / LME cash official (whichever is applicable) for all grades of steel.

W = Weight of steel in metric ton for Steel Gantries and equipment support structures based on the approved manufacturer's data and verified by the Employer's Representative for quantity used as per actual delivered to the Site which will become property of the Employer.

Grounding System, Control and small Power Cables

Only Price of Steel component shall be adjustable in price of grounding system, control and small power cables. Increase or decrease in the Price of grounding system, control and small power cables payable by Employer to the Contractor shall be calculated on the basis of the following formula:

$$P_1 = 0.9 \times (R - B) \times W$$

Where

P_1 = Adjustment in Price of Copper for grounding system, control and small power cables

B = is the basic rate of Copper (US$ per Metric Ton) twenty eight (28) days prior to the date of Bid Opening based on LME cash official.

R = is the revised rate of Copper (US$ per Metric Ton) prevailing twenty eight (28) days after the release of Advance Payment, based on LME cash official.

W = Weight of Copper in Metric Ton for grounding system, control and small power cables based on the approved manufacturer's data and verified by the Employer's Representative for the quantity used as per actual delivered to the Site which will become property of the Employer.

High Voltage Bus Work, Stranded & Tubular Conductors

Only Price of Aluminum component shall be adjustable in price of high voltage bus work, stranded & tubular conductors. Increase or decrease in the Price of high voltage bus work, stranded & tubular conductors payable by Employer to the Contractor shall be calculated on the basis of the following formula:

$$P_1 = 0.9 \times (R - B) \times W$$

Where

P_1 = Adjustment in Price of Aluminum for high voltage bus work, stranded & tubular conductors

B = is the basic rate of Aluminum (US$ per Metric Ton) twenty eight (28) days prior to the date of

	Bid Opening based on LME cash official. R = is the revised rate of Aluminum (US$ per Metric Ton) prevailing twenty eight (28) days after the release of Advance Payment, based on LME cash official. W = Weight of Aluminum in Metric Ton for high voltage bus work, stranded & tubular conductors based on the approved manufacturer's data and verified by the Employer's Representative for the quantity used as per actual delivered to the Site which will become property of the Employer. If the currency in which Contract Price is expressed is different from the currency of the country of origin of the materials indices, a correction factor shall correspond to the ratio of exchange rates between two currencies on the date for adjustment and base date as defined above. In determining the amount of any increase or decrease to the Contract Price pursuant to this section, no account shall be taken of any fluctuation as a result of Government orders or otherwise in the cost of benefits i.e. bonus, gratuity, education, group insurance, paid holidays, casual leaves, workmen compensation etc. Any increase or decrease in the price of materials which have not been used on the project in that month shall not be considered in the adjustment of the Contract Price, and the ratio will be taken as one (1). For each claim, the Contractor shall submit invoice from each source of supply. If at any time the current indices are not available, provisional indices as determined by the Project Manager or the Employer will be used subject to subsequent correction of the amounts paid to the Contractor when the current indices become available. The value of any revised rates or prices shall be supported by documentary evidence to the satisfaction of the Employer. No price adjustment shall be payable on the portion of the Contract Price paid to the Contractor as an Advance Payment. Price Escalation/Adjustment shall be applied only if the resulting increase or decrease is more than two percent (2%) of the amount of respective payment invoice calculated at the rates entered in the schedule of prices.
47.2	Following clause 47.2 is added and existing clause 47.2 is re-numbered as 47.3. (The formula/guidelines issued by Pakistan Engineering Council (PEC) (attached as annexure-) in May 2022 and or any latest version issued by PEC shall be applicable.)
48.1	**Customs and Import Duties** The Contractor shall pay all customs, import duties and taxes in consequence of the importation of the plant and Employer will reimburse it on actual basis.
48.3	Following Sub-Clauses 48.3 to 48.5 are added: **Port Charges and Port Congestion** The Contractor shall be deemed to have obtained all the information regarding facilities and charges, in respect of port clearance, loading and unloading, storage, transportation, congestion and confirmed the requirements thereof at his own responsibility and all such costs and charges are deemed to be included in the rates

	and prices of the Schedule of Prices.
48.4	If any tax exemptions, reductions, allowances, or privileges may be available to the Contractor in Pakistan, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.
48.5	For the purpose of the Contract, it is agreed that the Contract Price specified in the Contract Agreement is based on the taxes, duties, levies, and charges prevailing at the date 28 days prior to the date of bid submission in Pakistan (hereinafter called "Tax" in this GCC Subclause 48.5). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Subcontractors, or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 47.2 hereof.
	Sub-Clause 49.1 Notice to Contractor The following is added at the end of Sub-Clause 49.1: "For the purposes of Sub-Clause 49.1 the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract."
	Sub-Clause 50 Disputes & Arbitration Clause 50 is deleted and in its place the following Sub-Clauses 50.1 to 50.5 are inserted: 50.1 If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Project Manager/Engineer, the matter in dispute shall, in the first place, be referred in writing to the Project Manager/Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the fifty sixth (56) day after the day on which he received such reference, the Project Manager/Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause. Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Work with all due diligence, and the Contractor and the Employer shall give effect

		forthwith to every such decision of the Project Manager/Engineer unless and until the same shall be revised, as hereinafter provided in an amicable settlement or in an arbitral award. In any case where the Conditions of Contract provide that the decision of the Project Manager/Engineer is to be final and conclusive, such decision shall not be referable to arbitration under this Clause nor shall the same be questioned in any other form of proceedings whatsoever.
	50.2	If either the Employer or the Contractor be dissatisfied with a decision of the Project Manager/Engineer or if the Project Manager/Engineer fails to give notice of his decision on or before the fifty sixth (56) day after the day on which he received the reference, then either the Employer or the Contractor may, on or before the twenty eighth (28) days after the day on which the said period of fifty six (56) days expired, as the case may be, give notice to the other party to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 50.5, no arbitration in respect thereof may be commenced unless such notice is given. If the Project Manager/Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notification of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor on or before the twenty eighth (28) day after the day on which the parties received notice as to such decision from the Project Manager/Engineer the said decision shall become final and binding upon the Employer and the Contractor.
	50.3	Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 50.2, arbitration of such dispute shall not be commenced unless an attempt has first been made by the parties to settle such dispute amicably through mutual negotiation within ninety (90) days from the date of notification of Project Manager/Engineer's decision.
	50.4	Any dispute in respect of which: (a) the decision, if any, of the Project Manager/Engineer has not become final and binding pursuant to Sub-Clause 50.1 and (b) amicable settlement has not been started/reached within the period stated in Sub-Clause 50.3 shall be finally settled, unless otherwise specified in the Contract, under the Rules of Pakistan Arbitration Act, 1940 (Act No. X of 1940) and Rules made thereunder as amended, by one or more arbitrators appointed under such

	Rules. The said arbitrator(s) shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Project Manager/Engineer for the purpose of obtaining said decision pursuant to Sub-Clause 50.1. No such decision shall disqualify the Project Manager/Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute. The venue of arbitration proceedings shall be the place in Pakistan as mentioned in the Preamble to Conditions of Contract. 50.5 Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 50.1 or 50.2 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any other rights it may have, refer the failure to arbitration in accordance with Sub-Clause 50.4. The provisions of Sub-Clauses 50.1 to 50.2 shall not apply to any such reference."
	Following clauses 52 to 56 are added:
52	**Liens** Each contractor, for himself and for any persons directly or indirectly responsible to him, and for his or their material, equipment and employees, and for all other persons performing any labor or furnishing any labor or material for any/or all of the Work covered by his Contract, will be required to release or waive, to the full extent permitted by law, all mechanical and other liens, for or on account of the Work done or equipment and material furnished hereunder and the improvements or structures herein same may be incorporated, and the land to which they are appurtenant shall at all times be free and clear of all such liens
53	**Taxes and Duties**
53.1	Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies, and charges assessed on the Contractor, its Subcontractors, or their employees by all municipal, state, or national government authorities in connection with the Works in and outside of Pakistan. If Contractor is joint venture, it may authorize one partner to bear taxes, duties, levies and charges assessed on its behalf provided that the liability of the Contractor shall remain binding on it.
53.2	Notwithstanding GCC Sub-Clause 53.1 above, the Employer shall reimburse to the Contractor, all customs and import duties as well as other local taxes like, e.g., a value added tax (VAT), imposed by the law of Pakistan on the Plant specified in Schedule of Price No. 1 and that are to be incorporated into the Works on actual basis (without overhead and profits) within forty five (45) days against presentation of acceptable

	claim submitted to the Employer, supported by documentary evidence, from the Provisional Sums provided in the Schedules of Price. General Sales tax, Provincial sales Tax and all other taxes payable by the Contractor in Pakistan on the Plant specified in Schedule of Price No. 2, 3 & 4 that are to be incorporated into the Works shall be reimbursed by the Employer on actual basis (without overhead and profits) within forty five (45) days against presentation of acceptable claim submitted to the Employer, supported by documentary evidence, from the Provisional Sums provided in the Schedule of Price, provided that such reimbursements shall be subject to Withholding as per rules mentioned in respective federal and provincial laws of Employer's country and provided further that the contractor is registered with relevant Tax Authority(ies) and Employer can claim input from relevant Tax Authority(ies). The reimbursement of taxes will only be made if Employer's WEBOC system is used.
53.3	If any tax exemptions, reductions, allowances, or privileges may be available to the Contractor in Pakistan, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent. Further, any Tax Treatise will be considered between Employer's country and Contractor's country (if applicable).
53.4	For the purpose of the Contract, it is agreed that the Contract Price specified in Contract Agreement is based on the taxes, duties, levies, and charges prevailing at the date 28 days prior to the date of bid submission in Pakistan (hereinafter called "Tax" in this GCC Subclause 53.4). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Subcontractors, or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 47.2 hereof.
53.5	**Tax Provisions in Subcontracts** Provisions to the like effect as those contained in this Clause shall be incorporated in Subcontracts.
54	**Liability of the Contractor** The Contractor or his Subcontractors or assigns shall follow strictly, all relevant labour laws including the Workmen's Compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute between the Contractor, his Subcontractors or permitted assigns and the labour employed by them.
55.	**Joint and Several Liability** If the Contractor is a joint venture of two or more persons, all such persons shall be

	jointly and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.
56.	**Details to be Confidential** The Contractor shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Employer or the Project Manager/Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract, the same shall be referred to the decision of the Project Manager/Engineer whose award shall be final.

STANDARD FORMS

Standard Forms include the following:

- Form of Contract Agreement
- Form of Performance Security
  (Bank Guarantee)
- Form of Bank Guarantee/Bond for Advance Payment
- Indemnity Bond For Secured Advance
- Draft Performa Invoice
- Draft Letter of Credit.

(Note: Standard Forms provided in this document for securities are to be issued by a bank. In case the bidder chooses to issue a bond for accompanying his bid or performance of contract or receipt of advance, the relevant format shall be tailored accordingly without changing the spirit of the Forms of securities).

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____(month) 20_____ between _____ _____ (hereafter called the "Employer") of the one part and _____ (hereafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz _____ should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement, viz:

   (a) The Contract Agreement
   (b) Notification of Award (NOA)
   (c) The Letter of Acceptance
   (d) The completed Form of Bid
   (e) The Priced Schedule of Prices with Preamble
   (f) The Preamble to Conditions of Contract
   (g) The Particular Conditions of Contract
   (h) The General Conditions of Contract
   (i) The completed Schedules to Bid
   (j) The Specifications
   (k) The Drawings

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Contract Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of the Contactor	Signature of the Employer
_____	_____
(Seal)	(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:	Witness:
_____	_____
(Name, Title and Address)	(Name, Title and Address)

FORM OF PERFORMANCE SECURITY
(Bank Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address:_____
Name of Principal (Contractor) with address:_____
_____
Penal Sum of Security (express in words and figures)_____
_____
Letter of Acceptance No. _____Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ (hereinafter called the Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ _____ (Name of Contract) for the _____

_____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 30, Defects after Taking Over, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this

Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defences under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above-bounden Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____
Guarantor (Bank)

Witness:

1. _____ Signature _____

_____ Name _____
Corporate Secretary (Seal)

Title _____

2. _____

_____ _____
Name, Title & Address Corporate Guarantor (Seal)

FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

Guarantee No._____
Executed on_____
Expiry date _____

WHEREAS the _____ (hereinafter called the Employer) has entered into a Contract for _____
_____
_____ (Particulars of Contract), with
_____
_____ (hereinafter called the Contractor).

AND WHEREAS the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of _____ (Rs._____) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS the Employer has asked the Contractor to furnish Guarantee to secure advance payment for performance of his obligations under the said Contract.

AND WHEREAS _____ (Bank) (hereinafter called the Guarantor) at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW THEREFORE the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails, and commits default in fulfillment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Employer shall be the sole and final judge, as aforesaid, on the part of the Contractor, shall be given by the Employer to the Guarantor, and on such first written demand payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This guarantee shall come into force as soon as the advance payment has been credited to the account of the Contractor.

This guarantee shall expire not later than _____ by which date we must have received any claims by registered letter, telegram, telex or telefax.

It is understood that you will return this Guarantee to us on expiry or after settlement of the total amount to be claimed hereunder.

_____
Guarantor (Bank)

Witness:

1. _____ Signature _____

_____ Name _____
Corporate Secretary (Seal)

Title _____

2. _____

_____ _____
Name, Title & Address Corporate Guarantor (Seal)

INDEMNITY BOND FOR SECURED ADVANCE

AGAINST MATERIALS BROUGHT AT SITE

(ON RS.40 NONJUDICIAL STAMP PAPER)

This Deed of Indemnity is issued by M/s. _____ _____ *(Name* of *the Contractor)* in favour of *M/s.*_____ *(Name* of *the Employer).*

Whereas_____ (hereinafter called the Employer) has agreed to pay the Secured Advance against the cost of material through any Bank or like agency by any other method by virtue of the terms of the contract existing between the parties. The details of the material and their price for which secured advance is being sought for the period _____till consumption of the material is as under :-

1. _____ at Rs._____ per _____ = Rs.
2. _____ at Rs._____ per _____ = Rs.
3. _____ at Rs._____ per _____ = Rs.
4. _____ at Rs._____ per _____ = Rs.

THEREFORE THIS DEED OF INDEMNITY WITHNESSETH AS FOLLOWS:

I/We _____ of M/s. _____ do hereby indemnify M/s _____ for all losses due to thefts, arson, pilferage, loss due to flood and inundation, shortage, deterioration and depreciation etc. through any act of Man or God or slump in the Market of any or all the materials financed or paid by the Employer on our request for financing payment against material.

I/We_____ shall indemnify _____ against any or all claims, action damages arising out of or resulting to the said material.

I/We _____ further declare that we will faithfully abide by the above declaration and solemnly affirm that we will not remove, sell, pilferage any of the materials against which M/s __ has paid us such a secured advance and will not pledge the same with any Bank, Finance Corporation, Firm, Company, Individual or the like agency or create any change whereon in any from what so ever.

I/We_____do hereby also declare that in the event of my/our infringement of the declaration made above _____ will be entitled to forfeit all such material and also proceed against me/us according to the relevant clause pertaining to breach of contract and further invoke the power or seek any remedies secured of _____ under the contract Agreement signed with us or otherwise available under law.

Place_____ Dated _____

Contractor _____

DRAFT PERFORMA INVOICE

FOR OPENING OF LETTER OF CREDIT

[To be inserted by L/C Section O/o. CFO (NGC))]

DRAFT LETTER OF CREDIT

(To be treated as reference for opening of L/C)

(TO BE INSERTED AT THE TIME OF FINALIZATION OF DOCUMENT BY L/C SECTION O/O. CFO (NGC))

SECTION 8

SPECIAL PROVISIONS

SI-01 ACQUAINTANCE WITH SITE

The Bidder shall be deemed to have inspected and examined the site and its surroundings and information available in connection therewith before submitting his/her Bid. This includes but not limits to, the form and nature thereof, including the subsurface conditions, the hydrological and climatic conditions, the extent and nature of work, Goods and materials necessary for the completion of the Work, the means of access to the Site and the accommodation he may require and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Bid.

SI-02 DESCRIPTION OF PROJECT

The Facilities to be executed under this contract, on single responsibility basis, have been described above in Scope of Supply of Plant and Services.

SI-02.1 SITE OF PROJECT

(1) The project sites shall be deemed to comprise the area of spare land(reserved for 500kV switchyard) at existing 220/132 kV Substation Ludewala and spare land (for extension of 500kV switchyard) at existing 500/220/132kV Faisalabad West Substation together with such work areas, warehouse, workshop accommodation, work yard and storage areas and lay down areas as the Employer may from time to time provide adjacent to the Substations.

(2) Within the areas which may from time to time be defined as the Site, the Contractor shall carry out and perform the Facilities and subject to the approval of the Employer's Representative (Project Manager), will be permitted to construct temporary roadways, camps, buildings and temporary Facilities which he may require for the execution of the Facilities. If the Contractor wishes to use any land other than as aforesaid for construction of camps or for any other Contract purposes, the Contractor shall make all necessary arrangements with the owner thereof and shall bear all rentals or other costs connected therewith.

(3) The Employer will give to the Contractor possession of as much of the area designated and defined as the Site and shown on the drawings as may be required to commence and proceed in accordance with the programme referred to in Clause 18.2 of General Conditions.

(4) Existing structures specifically the operating portions of the substations, shall not be part of the Site and the Contractor shall have no right of access thereto except as otherwise provided by the Contract or as instructed or permitted by the Project Manager which permission shall not be unreasonably withheld.

SI-02.2 LOCATION OF SITES

i. Existing 220/132kV Ludewala substation
ii. Existing 500/220/132 kV Faisalabad substation

SI-03 SITE CONDITIONS

SI-03.1 Site Conditions and Meteorological Data

i. The site is subject to dust storms and insects and vermin are prevalent. Particular care must be taken in design to prevent the ingress of dust, insects, and vermin and to ensure resistance to attack by insects and vermin.
ii. The Employer does not guarantee the correctness of any data provided herein nor any interpretations, deductions or conclusions relative to subsurface conditions at Site. The Bidder/Contractor must form his own opinion of the character of the work and of the materials to be excavated. He must make his own interpretations, and satisfy himself by his own investigations and research regarding all conditions

affecting the work to be done. The Bidder/Contractor must assume all responsibility for deductions and conclusions as to the nature or conditions of the materials to be excavated and of doing other work affected by the geology at the Site.

iii. Meteorological data of the Substations in respect of the following parameters shall also be taken into account for designing purpose.

1	Temperature, Degree C	Max
		Min
2	No. of Thunder Storm days/year	Max
		Min
3	No. of Fog days per year	Max
		Min
4	No. of Rain fall days /year	Max
		Min
5	No. of Drizzles/year	Max
		Min
6	Relative humidity (%) yearly	Max
		Min
7	Pressure in mill bars (Station Level)	Max
		Min
8	Rail fall in a month, cm	Max
		Min
9	Rain fall in 24 hours, cm	Max
		Min
10	Wind, km/hour	Max

SI-03.2 Recommended Values for Design

The Plant/Goods for substation shall be suitable for continuous service under conditions specified in Technical Specifications (Volume-II) of these Bidding Documents

SI-04 APPROVAL OF FACILITIES

As soon as practicable after Award of Contract, the Contractor shall submit for the approval of the Employer, specifications, drawings, catalogues, cuts, diagrams and other descriptive data for all materials and components of equipment which the Contractor proposes for use under this Contract. For certain materials and Plant, data may be required to be submitted in accordance with a detailed form furnished by the Employer. Items submitted shall be properly labeled to indicate owner's name, the Contract number, Project, manufacturer, source of supply, Contract Item number, and other data required by the Specifications. All items shall be submitted in sufficient time, but not later than ninety (90) days prior to use thereof, to permit proper consideration and action thereon without delaying the approved time schedule. Item sent for approval shall be shipped prepaid by the Contractor to the Project Manager, and the Contractor shall give the Project Manager advance notice in writing of all items shipped.

SI-04.1 Material and Workmanship

1. All materials, manufacture, testing and workmanship of Plant and Equipment, shall comply with the requirements of the Contract Documents. Plant or parts which are not covered by these Specifications shall comply with the applicable standards, rules, codes and regulations of the Internationally approved standardizing bodies as indicated in these Contract Documents.
2. The intent of these Specifications is that the Plant, materials and workmanship of Facilities under this Contract should be equal to or superior than those actually described herein. Reference to a brand or manufacture, if made, is only for the sake of comparison as to type, design, character or quality of the Plant and equipment or parts and materials described and not be interpreted as eliminating other plant and materials of equal performance, quality and durability.

3. In choosing materials (IF ANY) and their finishes due regard shall be given to the conditions prevailing at Site.
4. All matters relating as to the acceptability or otherwise of Plant and materials offered under this Contract shall be decided by the Employer/Project Manager whose decision shall be final.

SI-04.2 Extent of Specifications

1. The extent of the Contract Documents is to provide for the Facilities herein specified to be fully complete in every detail for the function designated. All services which are not specifically mentioned in the Contract Documents, but which, in the opinion of the Employer/Project Manager, are usual or necessary for the satisfactory completion of the Facilities shall be deemed to be included in the Contract Documents and shall be provided by the Contractor without extra cost to the Employer.
2. The information pertaining to details of installation at Sub-station provided with these documents are for the general guidance of the Contractor only and any errors or omissions in this information shall neither absolve the Contractor from his responsibility of providing a functional and operative system full conforming to the technical requirement of the system as specified or as can be reasonably inferred from specifications, nor entitle him to claim by adjustments in prices or schedules on this account.

SI-05 DRAWINGS

SI-05.1 Drawings in Contract

SI-05.1.1 Specification Drawings

The specification drawings contained in the Volume-III of the Bidding Documents show the scope of Work to be performed by the Contractor.

SI-05.1.2 Contractor's Bid Drawings

The Contractor's bid drawings are the drawings prepared by Bidder/Contractor for bidding purposes, and shall be part of his bid. Both Specification Drawings and Contractor's Bid Drawings shall not be used for execution of the Facilities unless the Employer gives specific instructions for such use.

SI-05.1.3 Approved Drawings

The Facilities shall be constructed in accordance with the Approved drawings designed and prepared by the contractor in terms of Clause 20 of the General Conditions of Contract.

SI-05.2. Drawings and Data to be furnished by Contractor

All drawings and other data shall be in English language and all dimensions shall be in Metric System. Symbols shall be in accordance with IEC standards. All drawings shall be clearly marked:

- "National Grid Company of Pakistan, (NGC)"
- “500/220 kV Ludewala Substation” or “Extension at 500kV Faisalabad West substation” whichever is applicable

All drawings/data submitted for approval shall conform to ISO paper sizes A0 to A4.

The Contractor shall submit, base design and detailed civil, electrical and mechanical drawings for approval by the Employer, in accordance with Clause 20 of the General Conditions of the Contract, and the additional requirements specified in the respective Clauses hereof.

SI-05.2.1 Outline Schematic and Civil Works Drawings

The Contractor shall submit within the time given in the Contract or within such time as the Project Manager may require for approval, for approval of the Employer's Representative, the outline schematic, civil, electrical and mechanical drawings of all the Plant to be furnished under the Contract, together with overall and handling weights and dimensions of the Plant to be provided under the Contract.

Single line diagrams, general layout drawings, interlocking and base design drawings shall also form part of the outline drawings. The drawings shall also show the methods, equipment required and clearances necessary for erection and dismantling.

The Contractor shall submit architectural and structural drawings of the civil works showing detail of all loads, forces and moments acting on the structures.

Air Conditioning drawings and calculations shall also be submitted.

SI-05.2.2 Detail Drawings

The Contractor shall submit within the time given in the Contract or within such time as the Project Manager may require for approval by the Project Manager, detail drawings as required herein and in accordance with the schedule to be made by the Contractor and required by Clause 18.2 of the General Conditions of the Contract. All computations, drawings, functional description of equipment and schemes and other information required to check adequacy of the design shall accompany drawings submitted for approval. The drawings shall be complete, shall have been reviewed and checked by the Contractor and shall be submitted in due time and in logical order to facilitate proper co-ordination.

SI-05.2.3 Drawings, Data and Instruction Manuals

The following drawings shall be submitted within the time given in the Contract or within such time as the Project Manager may require and in accordance with the Schedule required by Clause 20 of the General Conditions of Contract:

1. Single Line Diagrams
2. Protection & Metering Concept and Logic Diagrams
3. Substation Layouts and Sections.
4. Foundation Layout Plan Drawings.
5. Cable Trenches Layout Plan along with sections (showing the details of cables in each trench)
6. Substation Control & Protection schematics.
7. Trip Logic Diagrams
8. Interlocking Diagrams
9. Interconnection Diagrams
10. Signal Lists
11. Specific Facilities Data/ Technical Data and manufacturer's catalogues of all electrical and mechanical equipment.
12. Construction details of all electrical and mechanical equipment.
13. Dimensions print of all electrical and mechanical equipment.
14. Control diagrams of Circuit Breaker and Disconnectors
15. Complete drawings for Auto-Transformers, Shunt Reactors and Power Transformers, schematic of control/ auxiliary panels.
16. Panels wiring Diagrams
17. Fabrication and assembly drawings of switchyard and indoor equipment.
18. Erection drawings
19. Current/voltage transformer performance calculation (stability & accuracy calculations)
20. Relay settings calculations
21. Substation Automation System (SAS) drawings
22. Telecommunication Engineering drawings
23. Telephone system, paging system drawings
24. Firefighting system drawings.
25. Substation Earthing System Drawings & Design Report
26. Substation Lightning protection Drawings & Design Report

27. Substation Lighting Drawings & Design Report
28. Terminal Loading Calculations of Switchyard equipment
29. Bus Bar Design Report(including the upgradation of existing 220kV double conductor bus bar with 3×810mm^2 Al. Alloy conductor (Coreopsis))
30. Battery Sizing Calculation
31. AC and DC Station Service Drawings.
32. Cable sizing calculations including voltage drop calculations for AC/DC circuits.
33. Cable schedules and terminal plan.
34. Civil works drawings
35. Structural and Architectural drawings
36. Drainage System drawings
37. Following drawings for Control House Building and Generator room:

a. Equipment Layout and equipment foundation details
b. Design details and layout of cable trenches, cable trays and cable racks
c. Layout of grounding cables for equipment grounding
d. Detail of all wall and roof openings
e. Building Lightning protection drawing as per IEC 62305 for Class LPSI protection.
f. Electrical wiring drawings
g. Any other detail necessary for installation of equipment in the buildings.

38. Instruction, operation and maintenance manuals for all equipment.
39. Any other drawing/data/calculation required by the Employer's Representative/Project Manager to demonstrate that all parts of the Plant being furnished / erected conform to the requirements of the Specifications.

SI-05.2.4 Data Other Than Drawings

All of the applicable requirements of this Clause with reference to drawings to be prepared by the Contractor shall apply equally to catalogues, illustrations, printed specifications, or other data submitted for approval.

SI-05.3 Submission and Approvals

SI-05.3.1 Drawings/data for Approval

Drawings for approval, shall be distributed through international couriers to addresses and in number as specified in Sub-Clause SI-05.3.6 hereof.

All drawings/data submitted for approval shall be provided with a blank white space, approximately 90 mm in height by 120 mm in width, near the lower right-hand corner to be used for notations by the Employer.

SI-05.3.2 Approval of Drawings/data

(1) All changes will be made and drawings will be marked "APPROVED", "APPROVED EXCEPT AS NOTED" or "RETURNED FOR CORRECTION" on the relevant drawings. One print will be returned to the Contractor. The other shall be retained by the Project Manager for his own use and shall serve as the Master Copy and shall prevail in case of any doubt or discrepancy subsequently arising.

(2) If the drawing is returned to the Contractor stamped "APPROVED" he may immediately proceed with the Work. Any drawing marked "APPROVED" by the Project Manager shall be known as an "Approved Drawing".

(3) If the drawing is returned to the Contractor stamped "APPROVED EXCEPT AS NOTED" he may proceed with the Work taking into account the corrections and comments noted on the drawing. The Contractor shall revise the drawings as required and resubmit them in the same routine as before for record purposes.

(4) If the drawing is returned to the Contractor stamped "RETURNED FOR CORRECTION" he shall not proceed with the Work but shall make the changes and corrections or prepare new drawings and resubmit the revised drawing to the Project Manager for approval at no change in price or Schedule. Resubmitted prints and calculations will be subject to the same routine as before. Time required for such revisions and re-submittal of drawings or calculations will not entitle the Contractor to any extension in Contract time.

(5) If the Contractor does not agree with exceptions taken by the Project Manager, the Contractor shall state in his letter of re-submittal his reasons for not complying with the Project Manager exceptions. Revision number and date and description of change shall be shown on all drawings or calculations revised.

SI-05.3.3 Facilities Prior to Approval

Any work done prior to the approval of drawings/data shall be at the Contractor's risk. The Project Manager shall have the right to request additional details and to require the Contractor to make any change in the design, which are necessary to conform to the provisions and intent of these Specifications and such changes shall be made without additional cost to Employer. The approval of the drawings/data by the Project Manager shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Approval by the Project Manager of the Contractor's drawings/data shall not be held to relieve the Contractor of the obligations to meet all the requirements of these Specifications or of the responsibility for the correctness of the Contractor's drawings/data or for correct fit of assembled Goods furnished by the Contractor.

SI-05.3.4 Sequence of Submission

The sequence of submission of all drawings shall be such that all information is available for checking each drawing when it is received.

SI-05.3.5 Approved Drawings and Revisions

All approved drawings and data shall form a part of the Contract. If revisions are made after a drawing has been approved, the Contractor shall furnish for approval additional copies specified for the initial submission, subsequent to each revision.

SI-05.3.6 Distribution of Drawings and Documents

The drawings and documents (as applicable) shall be submitted to Project Manager within the time given in the Contract or within such reasonable time as the Project Manager may require, and in the number as specified hereunder:

Document	Project Manager		Employer	Total
	Head Office	Site office		
Drawings/documents for approval	3	-	-	3
Approved Drawings/documents	2	2	1	5
Drawings for information	2	1	1	4
Schedules, specifications and other documents/data	2	1	1	4
Construction Drawings	2	6	2	10
Record Drawings for Approval	2	1	-	3
Record (As-Built) Drawings	2	-	4	6
Reproducible transparency Record (As-Built) Drawings	1	-	1	2
Record (As-Built) Drawings on computer compact diskette (CD) using AutoCAD software	1	-	3	4
Codes and standards	1	-	1	2

Document	Project Manager		Employer	Total
	Head Office	Site office		
Instruction Manuals for approval	2	-	1	3
Approved final Manuals	1	2	2	5
FAT/Type test procedure for approval	2	-	1	3
Approved test procedure	2	1	2	5
FAT/Type test reports	2	1	2	5
Completion/Commissioning test procedure for approval	2	1	2	5
Approved completion/ Commissioning test procedure	2	1	2	5
Manufacture progress information	2	1	2	5
Insurance Certificates	1	1	2	4
Receiving reports	1	1	2	4
Damage reports	1	1	2	4
Erection Progress Reports	2	1	2	5
List of Spare Parts	2	1	5	8
List of Construction Stringing and Erection Equipment	1	1	1	3
Operation & Maintenance Manual	3	-	12	15
Project Completion Reports	3	-	12	15
Correspondence with Employer	1	1	1	3
Correspondence to the Project Manager's Head Office	1	1	1	3
Correspondence to the Project Manager's site Office	1	1	1	3

SI-05.3.7 Record Drawings

In the event of the Plant or any part thereof being, with the approval of the Project Manager, properly built-in or installed otherwise than in accordance with the Approved Drawings, then the Contractor shall ensure that the Approved Drawings are marked up to show the conditions of the Plant as installed and at least two (2) copies of such marked up drawings shall be submitted by the Contractor to the Employer/Project Manager for approval. One copy of each of marked up drawings approved by the Project Manager shall be returned to the Contractor by the Project Manager and these shall be used for the preparation of the Record Drawings. A further copy of each of the marked up drawings shall be retained by the Project Manager for the purpose of checking the Record Drawings.

The Contractor shall furnish to the Employer six (6) complete sets of all Record Drawings and data prior to issuance of the Operational Acceptance Certificate. The Contractor shall also furnish to the Project Manager and the Employer one (1) set each of mylar polyester base full size reproducible of all final Record and other drawings which, in the opinion of the Project Manager/ Employer, may be required for the installation, construction of civil Facilities operation and maintenance, for identification of parts and for ordering replacement parts and materials. The mylar reproducible shall be 50/70 microns thick, double matte film, wash off film, printed on the front. Compact disk (CD/DVD) using Auto CAD shall be prepared for all approved drawings and As-Built drawings and shall be submitted to the Project Manager/Employer.

SI-05.3.8 Ownership of Drawings and Data Etc.

All the drawings, bills of Materials, compact disks (CDs) and any other information or documents furnished by the Contractor will become the property of Employer and will be non-returnable. Employer will have the right to use this property.

SI-06 STANDARDS AND TYPICAL DESIGN

SI-06.1 General

The Specifications cite or imply International Standards and typical design for Plant and material. Other equivalent Standards, and typical designs are equally acceptable provided that they in no way detract

from the quality, safety, operability of the Plant and materials furnished. However, when standards or typical design other than those cited or implied are offered by a bidder, he shall set forth in his bid the alternative standards proposed so that a direct comparison can be made before Contract Award. Each specific difference from the Specifications shall be clearly indicated by the bidder. If the bidder sets no alternatives forth, it will be assumed that Plant and material will be in accordance with the International Standards and typical design as cited or implied in the Specifications.

Where the documents provide requirements for material or Plant by specifying a standard such as, for example, one of the international standard organizations, which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards, including standards of other countries will be accepted provided the requirements thereof in the sole opinion of the Employer, are at least equal to the requirements of the standards specified. The Bidder may propose to the Employer an equivalent standard other than that specified, in which case he shall submit the proposed standard and all other information required by the Employer and shall submit written demonstration that his proposed standard is equivalent to or superior to the one specified herein. The submission must be made in English language. Moreover, the bidder shall also supply copy of the latest revision of the standards used in his design.

SI-06.2 Abbreviation of Standards

Standard specifications and codes of the following listed authorities wherever cited herein are referred to by use of the abbreviations shown below. All Plant shall be designed, manufactured and tested generally in accordance with attached Specifications and the latest revision of the standards laid down by the following institutions or other approved institutions, except where specifically directed otherwise:

		Abbreviation
1	American National Standards Institute, Inc. 1430 Broad-way, New York, New York 10018.	ANSI
2	American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.	ASTM
3	American Society of Mechanical Engineers 345 East 47th Street New York, New York 10017.	ASME
4	American Society of Civil Engineers 345 East 47th Street New York, New York 10017	ASCE
5	American Welding Society 345 East 47th Street, New York, New York 10017.	AWS
6	American Gear Manufacturer's Association.	AGMA
7	American Petroleum Institute.	API
8	British Standards Institution British Standard House 2 Park Street, London, W 1 England.	BS
9	Comite Consultalif International Telefonique et Telegraphique.	CCITT
10	Comite Consultalif International Radio	CCIR
11	Deutch Industrie Norms	DIN
12	Diesel Engine Manufacturer's Association	DEMA
13	Electronic Industries Association	EIA
14	International Electro-technical Commission, Geneva, Switzerland	IEC

		Abbreviation
15	Insulated Power Cable Engineers Association 230 Valley Road, Montclair New Jersey 07042.	IPCEA
16	National Electrical Manufacturers Association, 155 East 47th Street, New York, New York 10017.	NEMA
17	National Electrical Code, Board of Underwriters, 85 John Street, New York, New York, 1007, U.S.A	NEC
18	National Fire Protection Association, 60 Battery march Street Boston, Massachusetts 020110.	NFPA
19	Steel Structures Painting Council, 4400 Fifth Avenue Pittsburgh, Pa.15213	SSPC
20	Verband Deutscher Electro-techniker.	VDE
21	Institute of Electrical and Electronics Engineers	IEEE

SI-06.2 Applicable Standards and Codes

(1) All Plant and design shall be generally in accordance with the provisions of these Bidding Documents, Specifications mentioned herein and international standards. If Specifications mentioned herein conflict with any or all the standards, these Specifications shall have precedence and shall govern.

(2) In case deviation from the above standards is minor, the approval of the Project Manager may be given to the use of other national standards prevalent in the country of manufacture. No departure from the standard specified will be considered after the Contract has been awarded unless specific authorization is requested in writing from the Employer.

(3) When international standards (such as ANSI, NEMA, VDE,DIN, JIS) are only referred to, the bidder shall propose the IEC equivalent standards, if any. In this case, the Contractor shall attach four (04) sets in English language of the standards or rules applicable to his design, calculations, drawings or technical data within four (4) weeks following Effective Date of Contract.

SI-07 TROPICALIZATION

SI-07.1 General

In choosing materials and their finishes due regard shall be given to the tropical conditions under which Plant and Equipment may be called upon to work. Some relaxation of the following specifications may be permitted where Plant and Equipment is hermetically sealed but it is preferred that tropical grade materials should be used wherever possible. Requirements are detailed below and in the Technical Specifications.

SI-07.2 Metal

Iron and steel shall in general be painted or galvanized as appropriate. Painting shall be in accordance with the Technical Specifications. Indoor parts may alternatively have chromium or copper-nickel plating or other approved protective finish. Small iron and steel parts (other than stainless steel) of all instruments and electrical equipment, the cores of electromagnets, and the metal parts of relays and mechanism shall be treated in an approved manner to prevent rust. Cores, etc. which are built up of laminations or cannot for any other reason be anti-rust treated, shall have all exposed parts thoroughly cleaned and heavily enameled, lacquered or compounded. When it is necessary to use dissimilar metal in contact, these shall be so selected that the potential difference between them in the electro-chemical series is not greater than 0.5 volt. If this is not possible, the contact surfaces of one or both of the metal shall be electroplated or otherwise finished in such a manner that the potential difference is reduced to within the required limits or, alternatively, the two metals shall be insulated from each other by an approved insulating material or a coating or approved varnish compound.

SI-07.3 Screws, Nuts, Springs, Pivots, etc.

The use of iron and steel shall be avoided in instruments and electrical relays wherever possible. Steel screws, when used, shall be zinc, cadmium or chromium plated or, may be of corrosion resisting steel when plating is not possible owing to tolerance limitations. All wood screws shall be of dull nickel- plated brass or other approved finish. Instruments screws (except those forming part of a magnetic circuit) shall be of brass or bronze. Springs shall be of non-rusting material, e.g. phosphor bronze or nickel silver, as far as possible. Pivots and other parts for which nonferrous material is unsuitable shall be of an approved stainless steel where possible.

SI-07.4 Fabrics, Cork, Paper, etc.

Fabrics, cork, paper and similar materials, which are not subsequently to be protected by impregnation, shall be adequately treated with an approved fungicide. Sleeving and fabrics treated with linseed oil, or linseed oil varnishes shall not be used.

SI-07.5 Wood

The use of wood in Plant and Erection Equipment shall be avoided. When used, wood work shall be of thoroughly seasoned teak or other approved wood which is resistant to fungal decay and free from shakes and warp, sap and wane, knots faults and other blemishes. All woodwork shall be treated in approved manner to protect it against the ingress of moisture and from the growth of fungus and termite attack, unless it is naturally resistant to those causes of deterioration. All joints in wood-work shall be dovetailed or tongued and pinned if practicable. Metal fittings where used shall be of non-ferrous material.

SI-07.6 Adhesives

Adhesives shall be specially selected to ensure the use of type which are impervious to moisture, resistant to mould growth, and not subject to the ravages of insects. Synthetic resin cement only shall be used for jointing wood. Casein cement shall not be used.

SI-07.7 Electrical Material and Equipment

Materials and components which are inherently fungus resisting or are protected by hermetic sealing or oil immersion need not be treated. Other elements shall be protected by additional varnish for high humidity and given anti-fungus treatment.

SI-08 NAMEPLATES

The Contractor shall provide and attach to each major piece of equipment, a metal name and rating plate to be approved by the Project Manager, giving the name and address of the manufacturer, the date and rating data. All ratings shall be in English. Large lettering on any of the parts will not be permitted.

SI-09 PACKING AND MARKING

SI-09.1 Packing

(1) The Contractor shall prepare and pack all parts of the Plant and Equipment for shipment in accordance with the requirements of the Contract Documents and in the best possible manner to withstand damage or loss from repeated handling and extremes of climate during transport and storage at Site. All parts of the Plant and Equipment shall be packed so as to guarantee safe transportation of the Plant and Equipment to the Site under any conditions and limitations which may be encountered. The manner of packing shall be such that it protects the Plant and Equipment, and other material against breakages, damages and losses from the factory until its arrival at its final destination at the Site.

(2) The final packing shall be such that the weight and dimensions of packages are within reasonable limits in order to facilitate handling, storage and transportation.

(3) Tube ends and other similar open ends shall be protected from both external damages and ingress of dirt and moisture. Flanged pipe shall have their open ends protected by adhesive tape or jointing and then be covered with a wooden blank flange secured by service bolts. Precautions shall be taken to protect shafts and journals where they rest on wooden or other supports liable to contain moisture. At such points, wrappings, impregnated with anti-rust composition or vapor phase inhibitors shall be used, of sufficient strength to resist chafing and indentation due to movement which is likely to occur in transit. The protective wrappings and impregnations shall be suitable for a period of three (3) years. Lids and internal cross battens of all packing cases shall be fixed by screws and not nails. Hoop metal bindings of cases shall be sealed where ends meet and if not of rust-resisting material shall be painted.

(4) Each crate, case, box, package or bundle shall have labels and or tags made from strong waterproof material and marked in indelible and non-fadeable ink securely attached hereto. These labels or tags shall indicate at least the names of the Contract, the Consignee and the manufacturer, the type of Plant or component and the quantity it contains so that it can be easily checked upon delivery. A packing list shall be included in each crate or box.

(5) Each package delivered under the Contract shall be consecutively numbered and shall also be marked with code number or other identification to be approved by the Employer so that various components of the Plant and Equipment which are shipped, disassembled and which may not be interchangeable can be identified collected and stored at the Site together. Additional information and or colour coding that may reasonably be required by the Employer to facilitate identification, shipment to stores or site handling and storage will also be provided.

(6) All boxes weighing in excess of 500 kilograms shall be adequately marked for straining and lifting. Whenever necessary the boxes shall be provided with lifting hooks attached by means of vertical rods secured to strong bottom supports.

SI-09.2 Cases

Contents of cases shall be bolted securely or fastened in position with struts or cross battens and not with wood chocks wedged in place. All struts or cross battens shall preferably be supported by cleats fixed to the cases above and below to form edges on which the batten may rest. As required, cases shall be up-ended after packing to prove that there is no movement of contents. Where parts are required to be bolted to the sides of the case, large washers shall be used to distribute the pressure and the timber strengthened by means of a pad. Wood wool shall be avoided as far as possible. Water proof paper and felt linings shall overlap at seams at least 12.5 mm and the seams shall be secured together in an approved manner, but the enclosure shall be provided with screened openings for ventilation. Where practicable all indoor items such as electric motors, switches and control gears, instruments and panels, machine components, etc. shall be "cocooned" or covered in polyethylene sheeting, sealed at the joints and the enclosure provided internally with an approved desiccators. Prior to dispatch, the Contractor shall state what precautions are being taken to avoid indentation of the bearing races of roller bearings. If the method proposed is not approved or if no special precautions are taken, then, as required by the Project Manager, the Contractor shall have replacement bearings available at Site and shall replace indented bearings at his own expenses.

SI-09.3 Container Marking

In addition to labels and marking indicated above all packages, containers cases or boxes shall be clearly and boldly marked on two opposite sides and on the top as follows:

Consignee	Director (Custom Clearance & Logistics) Bungalow No. 44/N-1, Block-6, P.E.C.H.5 near Shahrah-e Faisal, Karachi
Ultimate Consignee	Chief Engineer (EHV-I), NGC, NTDC House, 34-Industrial Area, Gulberg-III, Lahore Pakistan Telephone: +92–42-99263246 Facsimile number: +92–42-99263247
Destination	----------
Contract No.	----------
Name of Project	----------
Weight And Dimension	----------
Serial Number	----------
Inscription	"NGC"

SI-7 TRANSPORTATION OF PLANT AND EQUIPMENT

SI-7.1 General

(1) The Contractor shall insure and transport the Plant and Equipment from its place of manufacture or origin to the Site and shall be solely responsible for selection of routes and carriers, and expediting in order that all Goods are safely and expeditiously transported to the Site.

(2) The Contractor shall carry out the maximum degree of shop assembly of the Plant and shall deliver maximum- sized sub-assemblies consistent with convenient and safe transportation.

SI-7.2 Shipping

The shipping of all the consignment relating to Plant/Goods and Contractor's Equipment shall be arranged by the Contractor through reputed shipping lines including PNSC. For working out a proper schedule to match the completion of Facilities, the Contractor will keep a continuous liaison with the Agent of the respective shipping line within the country of origin.

SI-7.3 Transportation in Pakistan

1. The Plant and Equipment coming by sea can be received by the Contractor either at Karachi Port or at Port Muhammad Bin Qasim or at Port Gawadar.
2. At Port Muhammad Bin Qasim, a conveyer belt nearby Steel Mill crosses the road with a clearance of 6 meters from road surface. In case the carrier with the consignment would be more than 6 meters in height, then the Plant and Equipment can be received at Karachi Port where, except for a busy road during the day, there is no constraint.
3. The Contractor however, shall be solely responsible for satisfying himself at the time of transportation as to the adequacy of the road surfaces and structures. All costs related with reinforcement of roads, structures, diversions and the like, if any, shall be borne by the Contractor. The Contractor shall advise the concerned authorities in advance of the proposed transit of the heaviest and largest items of Plant and Equipment and shall comply with instructions given by said authorities.
4. Within the limits imposed by law, the Contractor shall be entitled to utilize all the roads and other communication facilities existing in the country, to the same extent as any other use.

SI-7.4 Shipping Documents

Immediately after shipment leaves the port of embarkation, the Contractor shall submit complete and full shipping documents by airmail and by registered post or by courier service (in two separate covers to avoid non-delivery) to Chief Resident Representative (CRR) WAPDA, Chief Engineer (EHV-I) NGC, Lahore and Project Manager so as to reach at least fifteen (15) days in advance of the arrival of shipment at Karachi. The specified procedures are tentative. Final procedure will be agreed upon mutually.

Documents	For CRR WAPDA		For DG (MM&L) NGC, Lahore and the Project Manager
	Air Mail	Registered Cover	
Commercial Invoice/Payment Invoice Certificate of Origin	6	6	1 each
Warranty Certificate	3	3	1 each
Packing List	6	6	1 each
Ocean Bill of Lading or Airway Bill issued by the Freight Forwarder	2	1	1 Each
Non-negotiable bill of lading	3	3	1 each
Certificate or Policy of Marine Insurance from Manufacturers' works to the Project Site, of the Portion of the Plant for which Certificate of Payment is requested	3	3	1 each
Certificate that the Plant complies with the specifications	3	3	1 each
Certificate of Origin	3	3	1 each
Any other document as considered necessary by the Employer / Project Manager	---	---	---

2. The Bills of Lading shall show the following:

   a. Shipper's name
   b. Consigned to
   c. M.V. Sailing Approx. on
   d. Project name and Package No.
   e. Port of discharge
   f. Steamship Contract No.

3. All documents shall bear the following information:

   Contract No.
   Weight and Dimensions
   Serial No. of Package
   (NGC) Inscription

4. All the above documents are to be prepared per shipment even if it is a partial shipment. In no case shall the amount billed on the invoice cover items not contained in that particular shipment.

5. Should any demurrage charges be incurred by NGC due to any of the reasons mentioned below the same shall be deducted from any money or moneys due to contractor or recovered from him. The decision of the Chief Resident Representative, NGC, Karachi, regarding fixation of responsibility in this connection shall be binding on the Contractor.

a) Owing to delay in forwarding relevant and complete set of negotiable shipping documents including original invoices, showing item wise prices and packing list to the Chief Resident Representative, WAPDA, 152/J-2, P.E.C.H. Society, Karachi
b) late receipt of documents by the Chief Resident Representative, NGCL, Karachi due to incorrect and incomplete address;
c) due to receipt of incorrect or incomplete documents;
d) defective marking or packing of the goods ordered;
e) due to any other reason for which the Contractor is held responsible.

In case the negotiable documents are not available the non-negotiable documents should be sent to the Chief Resident Representative, NGC, Karachi, but on the condition that negotiable document will be endorsed to the Chief Resident Representative, NGC, Karachi immediately upon their receipt. If NGC has to incur any expenditure for want of negotiable documents the same shall also be recovered from the Contractor in addition to the demurrage if incurred.

SI-7.5 Lifting

The method of lifting, type of equipment and type of slings, used for handling the conductor reels are subject to approval by the Engineer. The wooden reels are so constructed as to be supported either on an axle through the arbour hole or by the reel flange. When an axle supported from above lifts the reels, a spreader bar must be employed to prevent reel damage by inward pressure on reel flange. In no case shall metallic slings or other metallic equipment shall come in contact with conductor or overhead shield wire or ground wire.

SI-7.6 Slings

If the use of slings is necessary, these shall be of a flexible type and preferably manila rope or other non-metallic materials. The use of steel wire, mesh or chain link slings is prohibited unless they are covered with rubber hose or some similar material.

SI-7.7 Unloading and Storage at the Site

1. The Contractor shall unload all Plant and Equipment and other material at the Site. Items for permanent installations shall be properly stored in areas designated by Employer and shall be protected as required to prevent damage or deterioration of any type. Storage methods shall be such as to cause minimum inconvenience to others and shall be arranged to facilitate inspection.
2. All Plant & Equipment and other material storage shall comply with the requirements of the Specifications or to the approval of the Project Manager.
3. Lifting of pieces, which are galvanized or painted, shall be by hand or by hemp rope on as approved by the Project Manager, or by wore rope which is suitable covered with rubber or similar material lifting by steel chains is prohibited. Steel pieces shall not be dropped, thrown, or skidded over steel, concrete or rock surfaces.

4. When steel components are stored temporarily they shall be blocked on wood & separated to prevent damage.

SI-7.8 Ownership of Packing Materials

All packing boxes, reels, shipping containers except those containers, which are not the property of the Contractor, planking covers, etc. shall become the property of Employer. All the packing materials shall be handed over to Employer immediately after storage requirements of the Goods or part thereof and other materials are over.

SI-7.9 Receiving Reports and/or Damage Reports

1. The Contractor shall prepare and submit receiving reports to Employer and Project Manager to cover shipments received and checked at the job Site and/or storage area. Shipment on arrival at the job Site and/or storage area shall be unloaded, opened, and carefully checked by the Contractor in the presence of a designated representative of Project Manager for any loss and damages in transit. In the event of loss and/or damage, the Contractor shall immediately submit a damage report to Employer and Project Manager countersigned by the Project Manager to the Insurance Company with copies to the Project Manager/Employer. Prompt action shall be taken and intimated to Project Manager / Employer to record the damaged or missing item(s) and it shall be ensured that the deliveries meet the final delivery dates and/or commissioning dates.
2. In all cases of irreparable damage, the Contractor shall immediately notify the original manufacturer(s) for re-manufacture and supply of the damaged part(s).

SI-8 SPARE PARTS

1. The Contractor shall provide the Spare Parts as required by the Price Schedules and Specifications. Additionally, a list of recommended spare parts for five (5) years operation shall be provided in the Price Schedules together with the prices. The Employer reserves the right to order any or all of the spare parts recommended by the Contractor in the Price Schedules. The payment for selected spare parts will be made at the prices entered in the Price Schedules. The Employer shall select from the recommended list provided by the Contractor in his Bid.
2. All spare parts shall be duplicates of the original parts furnished and interchangeable therewith. The list of required spare parts has been drawn up by the Employer in the Bidding Documents and are deemed adequate for a minimum of two (2) years satisfactory operation. These spare parts shall serve the Plant and suitably identified and packed for long storage in containers plainly marked "SPARE PARTS ONLY". A packing list indicating the contents of each such container, shall be securely fastened in a moisture- proof envelope to the outside of the container. The packing list shall also provide the following information:
   (a) Contractor/Manufacturer
   (b) Contract Number
   (c) Identification, including Contractor's drawing number, reference of each spare part in the container.

   All spare parts supplied shall be new, unused and inter-changeable with the parts for which they are intended to be replaced and shall be treated and packed for long storage under the climatic conditions prevailing at the Site. Each spare part shall be clearly marked or labelled on the outside of its packing with its description, purpose and Drawing reference and, when more than one spare part is packed in a single case or other container, a general description of its contents shall be shown on the outside of such case or container and a detailed list enclosed inside. All cases, containers and other packages must be suitably marked and numbered for identification.

   All cases, containers or other packages shall be opened at the Site for examination by the Project Manager’s and all such opening and subsequent repacking shall be at the responsibility and expense of the Contractor. The Contractor shall be responsible for identification of all spares after unpacking and relabelling after repacking.

   Following repacking to the satisfaction of the Project Manager’s the spare parts shall be handed over to the Employer at the Employer store.

Any spares covered by this Clause which may be expended during erection or commissioning to replace defective parts shall be replaced promptly by the Contractor at his expense.

The Contractor shall provide, not later than three (3) months before the spare parts are due to be shipped, a comprehensive "Schedule of Spare Parts". This schedule shall itemize each spare part and shall be complete with part numbers and drawing references to enable the Employer to easily relate spare parts with the installed Plant.

3. Following the Employer 's selection of additional recommended spare parts the Contractor shall prepare and deliver eight (8) copies of the final consolidated Spare Parts List, showing the unit prices and quantities. All required spare parts must be delivered at Site no later than the date of commencement of testing of the Plant.
4. Any spare parts consumed by the Contractor before Operational Acceptance shall be expeditiously replaced without cost to Employer.
5. The Contractor shall follow a system of designating and tagging each and every spare part for ease of inventory store keeping. The final consolidated Spare Parts List shall bear such tagging particulars as will be convenient to locate the spare part without any loss of time.
6. All spare parts must be prepared and protected for long-term storage to preclude damage. Storage requirements shall be submitted to the Employer/Project Manager's.

7. All spare parts lists shall be in English.

SI-9 ERECTION AND TESTING EQUIPMENT AND MAINTENANCE TOOLS

SI-9.1 General

1. The Contractor shall provide the Erection Equipment required by the Price Schedule and shall also propose and list, erection equipment which are recommended by him, in addition to those specified in the Price Schedule. The special erection equipment shall be of the type not normally available and are necessitated by the design of the Plant and is required or convenient for the erection, testing and commissioning of Plant ready for operation. The list of equipment shall include description and use, as well as quantity of each item and the unit rates and prices for the total quantity proposed for each item.

   For the purpose of clarification, the terms 'Erection Equipment' where used throughout this document shall mean 'Erection and Testing Equipment and Maintenance Tools'.

2. The Contractor shall furnish, suitably boxed, one complete set of new and unused tools, including special wrenches, spanners, other tools, etc., which are necessary or convenient for operation, maintenance, or complete replacement of all Plant under the Contract. Complete lists of all such tools shall be submitted to NGC before shipment of the tools. Shipment containers shall be suitable for permanent storage of the tools.
3. The Employer is not bound to purchase all the Additional Recommended Erection and Testing Equipment and Maintenance Tools. The Employer reserves the right to order any or all of the Additional Recommended Erection and Testing Equipment and Maintenance Tools. The payment for the selected items will be made at the prices entered in the Price Schedules. The Employer shall have the option to select the items needed by him.

   Each tool or appliance shall be clearly marked with its size and or purpose, shall not be used for erection and shall be handed over in new condition. Copies of its certificates for lifting appliances shall be handed over at the time of issue of the Operational Acceptance Certificate.

   Each set of maintenance tools and appliances shall be suitably arranged in boxes of mild steel construction, the number of boxes being determined in relation to the layout of the equipment in question. If the weight of any box and its contents should be such that it cannot conveniently be carried (maximum 25 kg), it shall be supported on steerable rubber-tyred wheels.

   Each box shall be painted, fitted with a lock and clearly marked in white letters with the name of the item of equipment for which the tools and appliances contained are intended to be used.

   The tools and appliances with the appropriate boxes shall be handed over to the Employer before issuance of Operational Acceptance Certificate.

SI-9.2 Payment

The Project Manager will select the Erection and Testing Equipment and Maintenance Tools which the Contractor will be required to provide from the Additional Recommended Erection Equipment in the Bid. Payments for such items will be made at the prices entered in the Price Schedule.

SI-10 SHOP INSPECTION AND ORDERS FOR PLANT & EQUIPMENT

SI-10.1 Inspection

Unless otherwise authorized by the Project Manager no material or equipment shall be shipped from its point of original manufacture or final shop assembly before it has been inspected and approved by the Project Manager.

SI-10.2 Plant & Equipment Orders

The Contractor shall provide to the Project Manager a list of Sub-Contractors and Vendors with whom orders are to be placed for materials or equipment which will enter directly into the work of the Contract. Triplicate copies of material or equipment orders and list of stock material or equipment shall be provided to the Project Manager. All orders and stock lists shall state the standard specification under which the material is to be furnished, pertinent drawing and part numbers if any, and the required delivery date, and shall state the material is subject to inspection and testing by the Project Manager.

SI-10.3 Acceptance of Materials

The approval by the Project Manager of any material or equipment prior to shipment shall in no way relieve the Contractor of any of his responsibilities for meeting all of the requirements of the Specifications and shall not prevent subsequent rejection if such material or equipment is later found to be defective or not conforming to the Specifications.

SI-11 SHOP PAINTING AND FINAL PAINTING

Where shop painting is not described in the Specifications but is nevertheless necessary to adequately protect or finish the Plant/Goods and material supplied hereunder, Contractor shall supply and apply such paint in accordance with best practices using the highest quality paint products. Surfaces to be painted shall be properly cleaned and/or sand blasted, and then given coast of rust inhibitive primer and other paints as required. The Contractor shall paint prime as required and finish equipment and surfaces using the highest quality paint products, which will be according to the approval of the Project Manager.

SI-12 SCHEDULE, PROGRESS REPORTS AND MEETINGS

SI-12.1 Schedule

The Contractor shall carry out the Work in accordance with the dates/ periods specified in the Contract and with the approved Schedule. The Contractor shall regularly review the Schedule and notify the Employer promptly of any revisions, which in his view may be required from time to time.

SI-12.1.1 Form of Schedule

The Schedule shall be a detailed CPM (critical path method) type, time scaled according to calendar dates and Project month numbers. The CPM for planning, scheduling, and controlling will be used for the Contract. The Contractor shall submit a schedule showing the logical sequence in which the Work will be carried out in sufficient detail to satisfy the Employer/Project Manager that the Facilities are thoroughly planned and meets all the requirements of the Contract Documents.

SI-12.1.2 Schedule of Shipping of Plant and Equipment to Site

1. Each group of Plant and Equipment shall be completely delivered to the Site stated in the Contract according to Shipping Schedule to be submitted for approval by the Project Manager atleast six (6) weeks before shipment. The Contractor shall keep the Project Manager informed of the progress of the Contract and notify the Project Manager approximately sixty (60) days in advance, in writing, as to when the Plant/Goods will be ready for inspection and for shipping/delivering and shall supply

lists covering each consignment in sufficient detail to enable the Project Manager to check the contents of the packages.

2. In preparing the Shipping Schedule, the Contractor shall fully take into account the requirements (and possibilities) for ocean (or air) freight, inland transportation and expediting through customs. Progress of all shipments/deliveries to the Site shall be continuously monitored and the Contractor shall provide staff or agents to expedite all shipments/deliveries to ensure compliance with the approved Schedule.

SI-12.1.3 Erection/Construction Schedule

1. The delivery of sub-assemblies and other parts of the Plant should be so estimated so as to permit erection work and construction work to proceed in an orderly manner so that the Plant can be completed by the required Commissioning Dates. The Contractor in preparing and regularly reviewing the Schedule in respect of the erection work shall comply with the requirements of the Contract.
2. The Contractor shall promptly bring to the attention of the Project Manager any amendment to the Schedule which in his view may at any time be required to ensure that the Commissioning Date/Periods will be met.

SI-12.2 Progress Reports

(1) The Contractor within twenty-eight (28) days after the Effective Date shall submit in writing for the approval of Employer/Project Manager a Schedule for the design, manufacture, delivery, erection, testing and commissioning of the Goods and design and construction of the associated civil work.

(2) The submission to or approval by the Employer/Project Manager of such Schedule etc. shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

(3) At monthly intervals after submission of the Schedule, the Contractor shall submit to the Employer/Project Manager up to five (5) copies of a written detailed progress report in an approved form together with copies of the above-mentioned Schedule indicating the stage reached in transportation of goods, erection/construction, in percentage terms. Such monthly reports shall show the actual progress plotted against the scheduled progress. These reports shall be accompanied by such photographs, diagrams, bar charts, and curves in approved standard form, as may be required by the Employer/Project Manager. The reports shall be forwarded not later than the 8th of the subsequent month. The numbers of copies shall be as stipulated in the Specifications or as instructed by the Employer/Project Manager.

(4) The Project manager shall at all reasonable times be afforded access to the Contractor and any Sub-Contractor's premises for the purpose of ascertaining progress.

SI-12.3 Meetings

(1) Soon after the date of signing of Contract, the Project Manager/Employer will require a conference with the Contractor at a place mutually agreed upon, to discuss scheduling of drawings, manufacture, scheduled sequences of delivery and other similar problems which may be pertinent to the completion of the Project.

(2) At monthly intervals or from time to time during the execution of the Contract, the Project Manager/Employer may call meetings, either in his Offices or at the Contractor's Offices in Pakistan as is deemed necessary for the purpose of progress monitoring and proper execution of the Contract.

(3) As required by the Project Manager, responsible representatives of the Contractor shall attend such meetings.

(4) All expenses incurred by the Contractor for attending such meetings shall be borne by the Contractor and shall not be reimbursable.

SI-13 FAILURE TO MEET GUARANTEES

For the removal of the doubt it is stated that should the Plant/Goods fail to meet the guaranteed characteristics, it will constitute a defect within the meaning of Clauses 26, 27 & 28 of the General Conditions of Contract.

Pursuant to Sub-Clause 25.2 of the General Conditions of Contract results of the Guarantee Tests will be used in calculating the Liquidated Damages.

The value and limitation on Liquidated Damages for failure to meet guarantees are specified in Sub-Clause 28.4 of General Conditions of Contract.

SI-14 REPAIRS AFTER TAKING OVER

NGC will operate the Plant after it has passed the Commissioning Tests and prior to the Final Acceptance Tests. All repairs or alterations found to be necessary to meet Contract requirements during such operation shall be made by the Contractor as directed by the Project Manager in such a manner and at such a time as will cause the minimum interruption in the use of the Plant and Equipment by the Employer.

SI-15 INSTRUCTION MANUALS

SI-15.1 General

Pursuant to Clause 20.3 of the General Conditions of Contract the Contractor shall provide Instruction Manuals in four (4) volumes, one of each of the four sections referred to below, divided into chapters dealing with each major item of Plant or Erection Equipment, to cover transport to the Site, unloading, storing (the "Handling Section") for installation, testing and setting to work (the "Site. Testing Section"), and operation and maintenance (the "Operation and Maintenance Section"). Each volume shall be on ISO paper size A4 (210 x 297mm) paper 80 to 90 grams with offset or equivalent printing strongly bound in a durable stiff cover bearing the title in approved legend. Drawings shall be folded or reduced to 297 mm height. All volumes shall bear on the spine an approved shortened version of the title.

SI-15.2 Supplement to the Instruction Manuals

Following complete installation, testing and taking over the Plant by the Employer, the drawings shall be revised to include all changes, and revised drawings shall be submitted as a supplement to the Instruction Manuals.

SI-16 SITE FACILITIES AND SERVICES

(a) Attention is drawn to the obligations of the Contractor to make his own arrangements at his expense for Services or facilities provided to his employees. Any cost incurred by the Contractor in respect of any such Site facilities or services under the Contract shall be deemed to be included in the rates and prices in the Price Schedules and no separate payment, therefore, will be made to the Contractor.

SI-16.1 Accommodation

(1) The Contractor shall provide and maintain at his cost residential accommodation and transportation facilities for his own use.

(2) The Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all of his supervisory staff and labour employed for the purposes of or in connection with this Contract including all electricity, supply, sanitation, cook houses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, the Contractor shall, unless otherwise specified or agreed with the Employer, hand over to the Employer in good working condition (apart from normal wear and tear) on completion of the Contract or as may otherwise be stipulated in the Specifications, all such accommodations and amenities.

SI-16.2 Offices

The Contractor shall arrange and maintain his offices at his own cost.

SI-16.3 Work yards and Storage Areas

(1) Pursuant to Clause SI-7.7 hereof, no roofed structure shall be provided by the Employer to store Goods, materials or equipment. The Contractor shall procure, furnish, provide and arrange for all the necessary services and be responsible for the construction and maintenance of the necessary construction campus,

offices and warehouses; and perform all other work necessary for completion of the Work described herein in strict conformance with these Specifications.

(2) Outdoor storage space is available at the Site. The Contractor shall cooperate with other contractors in the use of the storage space assigned to him by the Employer.

(3) The Contractor shall provide his own security/ watchman service to ensure security and safety of the Goods, materials and Work prior to NGC taking over the Work.

SI-16.4 Temporary Buildings

(1) The Contractor shall provide and maintain all temporary structures required including warehouses, change houses for workmen, sheds, etc. He shall also provide his own field office complete with telephone so that he or his official representative can be contacted by NGC and/or Employer/Project Manager at all times.

(2) Such temporary buildings and/or utilities shall remain the property of the Contractor and shall be removed by him at his expense upon the completion of the Work and the Site reinstated to its original condition, all to the approval of the Employer/Project Manager.

(3) All temporary erection facilities described above shall be removed by the Contractor after completion of the Facilities, and the site cleared and cleaned of refuse or other foreign material as per instructions of the Employer/Project Manager.

SI-16.5 Electricity

The Contractor will arrange metered three phase AC power supply of proper KVA rating for Substation service for temporary construction purpose, inside the Grid station area. The bill for the energy consumed shall be paid by the Contractor at applicable standard PEPCO tariff. The Employer does not guarantee or accept any responsibility for regular supply of electricity without any interruption or breakdowns.

SI-17 TRAINING OF EMPLOYER'S STAFF

Job Site Training

When the Employer deems it advisable to send on the Site those employees later intended to operate and maintain the Plant and Equipment supplied under this Contract, the Contractor shall, without additional cost, instruct such employees in the operation and maintenance of the said Plant and Equipment. This course of instruction shall be carried out by one or more of the Contractor's Plant Erectors and such instructions shall be in English language. These services may commence during installation of the Plant & equipment and shall be required periodically upto the Operational Acceptance.

SI-18 PAYMENT FOR WORK REQUIRED BY SPECIAL PROVISIONS

Unless expressly excluded, the cost of all Facilities required by the “Special Provisions” shall be considered to be included in the price and amounts quoted in the Price Schedules.

SI-19 EXPEDITING

The Contractor shall provide the Project Manager/ Employer with unpriced copies of the Contractor’s Purchase Orders for Plant and Equipment or approved Sub-Contracted work at the time any such orders are placed. The Contractor shall also provide the Project Manager/ Employer with any other relevant information requested to ensure proper expediting and scheduling of the Facilities.c

SI-20 COMMUNICATIONS WITH THE PROJECT MANAGER/EMPLOYER

Pursuant to the definition of Project Manager/Employer, Clause 1 of the General Conditions of Contract, the the Contractor shall address all communications as follows :-

Project Manager,

_____

_____

_____

Telephone: _____

Fax: _____

E-mail: _____

SECTION 9

TECHNICAL PROVISIONS

Scope of Supply of Plant and Services

Scope of the supply of Plant and Services includes but not limited to design, manufacturing, testing, delivery to wharf at seaport of Pakistan, unloading and loading at seaport, transportation to the substation site, unloading and storage at site, insurance to site, designing & construction of associated civil works/structure according to the site requirements considering the required seismic factors by following the Building Code of Pakistan (Seismic Provision-2007I issued by the Ministry of Housing and Works Government of Pakistan [SP-2007] including control house building, mechanical works building, 132kV Relay Building, Metering room, equipment foundations, trenches, fencing around switchyard, switchyard Paths & transformer ways, switchyard gate, lightning arrangement, fire protection walls, walk ways, complete erection, testing and commissioning, preparation of operation & maintenance manual and project completion report etc of upgradation of existing 220/132kV Ludewala Substation to 500/220/132 kV Substation and associated Extension Work at 500kV Faisalabad West Substation, for below mentioned scope of work complete in all respects and as per Section III: Schedule of prices:

A - 500/220 kV Ludewala Substation

500kV Side (One and Half Breaker Scheme having three (3) complete Dias and one half dia)

i). Two(2) No. Transformer Bays with 3×250 MVA, 525/231/23 kV Auto Transformer Bank.

ii). Five(5) No. 500 kV Line Bays.

iii). Five(5) No. Shunt Reactor Bay with 3×37 MVAR(at 500kV),550/√3 kV Shunt Reactors Bank.

iv). Two No. CVT Bays.

v). Protection, control, metering and Telecommunication & SCADA system.

220kV Side (One and Half Breaker Scheme two(2) half Dia)

i). Two(2) No. Transformer Bays for 3×250 MVA, 525/231/23 kV Auto Transformer Bank.

ii). Protection, control, metering and Telecommunication & SCADA system.

iii). Upgradation of existing 220kV double conductor bus bar to 3×810mm2 Al. Alloy conductor (Coreopsis)

B - Extension Work at 500kV Faisalabad West Substation

500kV Side (One and Half Breaker Scheme two(2) half Dia)

i). Two(2) No. 500 kV Line Bays.

ii). Protection, control, metering and Telecommunication & SCADA system, ci.

Note: For detail scope of work please also refer to the relevant drawings of this tender document.

C- Project Completion Period

The Contractor shall complete the above-mentioned scope of work in accordance with the following mandatory completion milestones:

i). Completion Milestone-I

The Contractor shall complete, in all respects, the following works within 480 days from the Commencement Date:

1. The complete extension scope of work at 500 kV Faisalabad West Substation as per Section III: Schedule of Prices; and
2. The complete upgradation-related scope of work at 500 kV Ludewala Substation as per Section III: Schedule of Prices, except for the supply and commissioning of the 500KV Auto Transformer Banks.

By the end of the 480-day period, complete scope of works at both substations, other than the supply and commissioning of the Auto Transformer Banks, shall have been completed, tested and made fully available for operation. The Contractor must complete all the upgradation works at 500KV Ludewala Substation scope including construction of complete 500KV switchyard, 220kv switchyard works, Transformer Bays civil works, equipment installation etc. as per Schedule of Prices in all aspects within the mentioned 480 days and only supply and commissioning of 500KV Auto Transformer Banks to be done with next 120 days.

The Contractor shall ensure that both substations are fully available to provide the required back-feed to the C-5 Project within the aforesaid 480-day period.

ii). Completion Milestone-II

The Contractor shall complete the remaining scope, including the supply, installation, testing and commissioning of the Auto Transformer Banks at 500 kV Ludewala Substation, within 600 days from the Commencement Date.

The Auto Transformer Banks, including all associated works, testing, protection, control, auxiliary systems and other activities necessary for their safe and satisfactory operation, shall be fully commissioned and ready for commercial operation by the end of the 600-day period.

c. Restriction on Use of the Additional 120 Days

The period from 481 days to 600 days shall be available only for completion of activities related to the Auto Transformer Banks and their associated works.

The Contractor shall not defer, postpone or carry forward any other work forming part of the 480-day milestone into the period beyond 480 days.

Failure to achieve the 480-day milestone shall constitute a failure to meet a mandatory contractual milestone, notwithstanding the overall final completion period of 600 days.

d. Contractor's Planning Responsibility

The Contractor shall plan and execute the procurement, manufacturing, delivery, construction, installation, testing and commissioning activities in such a manner that:

- all works other than the Auto Transformer Banks are completed within 480 days; and
- the Auto Transformer Banks and all associated remaining works are fully completed and commissioned within 600 days.

The Contractor shall not be entitled to any extension of time for activities that could reasonably have been completed within the 480-day milestone due to the Contractor's planning, procurement, engineering, construction or coordination arrangements.

I. General Technical Provisions for scope of Work

1. Design (Electrical, Mechanical & Civil) of a complete 500kV Grid Station as per above mentioned scope, complete in all aspects along with all allied facilities as per international practice, ready to use, to house and install the plant supplied as per Schedules of Rates & Prices, section-III of this bidding document.
2. The contractor shall carry out soil investigation and submit the Geotechnical Investigation report prior to submission of detailed design for approval by the Employer. The quantities of civil work shall be adjusted

according to detailed design and approved drawings. Unit Rates quoted in the bid shall remain firm and final.

3. The contractor shall design & prepare switchyard layouts, foundation plan, trench layout etc. in appropriate terraces/ levels as per site conditions to minimize cutting and filling with proper provisions of rain water drainage, the same to be approved by the Project Manager. For this purpose the contractor will first prepare the contour plan of project site and get approval of the Project Manager.
4. Substation design including preparation of General Layout Plan (GLO), Contour Plan, Single Line diagram, Switchyard/Equipment Layout, Foundation Layout Plan, Tubular & strain Bus Bars design, trench Layout Plan, protection/ schematics drawings, relay setting, telecom & SCADA design, substation earthing & Lightning protection, Substation lighting etc shall be the responsibility of the Contractor. Although, it is an EPC contract, however, some of the data/ drawings are provided for general information of the prospective bidders.
5. All civil works drawings, including architectural and structural drawings for CHB, generator room, switchyard equipment foundations, gantries, steel support structures, trenches, switchyard fences/gates, fire protection walls, water supply, sewerage, and all other allied structures, shall be designed considering the recommendations of the Geotechnical Investigation Report and in accordance with the applicable provisions of the Building Code of Pakistan (Seismic Provisions-2007). For buildings/structures, where applicable, the requirements of the Energy Conservation Building Code (2023) of Pakistan shall also be complied with. All such drawings alongwith requisite models and design calculations shall be submitted to the Project Manager for review and approval.
6. Construction of following Civil Works as per approved design:
   a) Construction of equipment foundations including erection of foundation bolts and steel mounting channels for all the equipment in the switchyard and for indoor equipment as detailed in the approved drawings.
   b) Construction of cable trenches, draw pits and culverts in the switchyard along with hangers/cable supports/trays inside the trenches in switchyard and CHB as detailed in approved drawings. Switchyard trenches shall be designed with gradual slope for proper dispersal/ drainage of rain water keeping in view the safety of other equipment in the Switchyard.
   c) Construction of foundation for steel structures as detailed in relevant approved drawings, and erection of steel structures according to the approved drawings.
   d) Construction of drive ways, walk ways, transformer ways, switch yard fence, switchyard gate, switchyard surface drainage system, Fire Protection walls, Oil & water separation tank, laying of gravel in switchyard along with any other civil work not mentioned above but deemed necessary for successful completion of switchyard indoor/outdoor equipment. Switchyard paths/ roads shall be designed keeping in view the slope of switchyard, future extension and movement of washing cranes and its clearance from equipment/ live parts.
   e) Construction of Control House building with trenches, cables hangers/trays, cable risers etc.as detailed in approved drawings.
   f) Construction of Generator room with trenches, cables hangers/trays, cable risers etc.as detailed in approved drawings.
   g) Provisions of access roads/ paths where necessary.
   h) Clearing right of way including disposal of cleared materials.
   i) Excavation, dewatering, shuttering, curing, leveling/ grading, slope protection (where necessary), backfilling, compaction and disposal of surplus earth/excavated material from site area.
   j) All necessary provisions in context of civil works shall be made / carried out for ready connection of SCADA and Remote control system.
   k) All other ancillary items for the completion of the work not specifically mentioned above.
7. The scope of installation/erection, testing & commissioning includes but not limited to the following:
   a) Installation/Erection complete with accessories, cable laying & terminations, connection of these with the Plant, equipment to local control protection cubicles, interconnection, wiring, testing and commissioning, complete in all respects, of the plant, comprising of the following major equipment and its all allied accessories required for complete installation & successful operation, to be supplied against serial no. 1 above:

- 525/231/23 kV, 3×250 MVA Auto Transformer Bank along with Nitrogen Injection Explosion Prevention & Fire Protection System, Neutral Bus and tertiary interconnection arrangement and all allied equipment & accessories as specified.
- 550/√3 kV, 3×37 MVAR(at 500kV) Shunt Reactors Bank along with Nitrogen Injection Explosion Prevention & Fire Protection System, Neutral Bus arrangement, transfer Bus arrangement and all allied equipment & accessories as specified.
- 550kV and 245kV SF6 power circuit breakers together with supporting structures , allied accessories, marshaling kiosk and operating mechanisms.
- 550kV and 245kV disconnectors, Earthing Platforms together with steel supporting structure, allied accessories operating mechanism and control cabinets.
- 550kV and 245kV current transformers together with supporting structures, allied accessories and marshaling boxes.
- 550kV and 245kV Capacitor Coupling/ Capacitive Voltage (CCVT/CVT) transformers, marshaling box along with supporting structures.
- 444kV and 198kV surge arresters, surge counter, leakage meter along with steel supporting structures.
- 550kV and 245kV post insulators together with supporting structures.
- Any other equipment not mentioned above but necessary for successful operation of the Plant

b) Assembly and erection of steel gantries for 550kV and 220kV High level and low level bus work. The contractor shall designed the steel gantries as per tender specifications and get approved the same from Project Manager.

c) Erection and installation of the equipment comprising of but not limited to the followings:-

- Overhead strain bus work, line and transformer take-off conductors and shield wires.
- Substation underground earthing system together with earthing mats in 550kV and 220kV yards. The contractor shall carry out Earth resistivity test and submit the report prior to submission of detailed earthing design for approval by the Employer.
- 2 Nos. 11.5/0.415kV 630kVA station auxiliary transformers, complete with accessories.
- Equipment interconnection work.
- Indoor and outdoor AC and DC distribution panels alongwith all AC and DC supply schemes of the substations for control, protection and marshalling kiosk in the switchyard.
- 625 kVA, 415 V Standby Diesel Generator along with automatic changeover.
- Any other works necessary for successful operation of Substation

d) Installation/ Erection, cable laying, wiring & termination, interconnection/ interfacing with yard equipment, testing & commissioning as per scheme of all secondary equipment comprising but not limited to the followings: -

- All Control Panels, Relay panels, Event/Fault Recorder panels, Local Control cubicles, Substation Automation System along with communication interface at bay level, station level & NPCC level, Monitoring & Metering System, Metering panels, transformer auxiliary panels.
- For Extension works in 220kV Switchyard of 500/220/132kV Ludewala Substation and 500kV switchyard of 500/220/132kV Faisalabad West Substation, the extension in all related protection/control schemes of existing 500 kV & 220kV Busbar-I & II, Breaker Failure, Synchronizing scheme, Common Control / Voltage Recording Scheme, Event Recorder, Fault Recorder, AC/DC Auxiliary Supply schemes & switchyard equipment (i.e. 500 kV & 220kV Lines, Circuit Breakers, Isolators, Earth switches, CTs, PTs etc.). In this respect the supply of all material/equipment is also included in scope of work and is the responsibility of the contractor. NGC will not provide any material/equipment for this purpose.
- 220 V DC batteries and battery chargers. In Schedule of Prices, the four (4) Sets 600AH batteries with 100A Battery Charger are mentioned two (2) each for 500kV & 220kV equipment of 500/220/132kV Ludewala Substation. For 220kV switchyard the new set of 220V DC batteries and battery chargers will replace the existing 220V DC batteries and battery charger. This is the minimum requirement, the contractor/bidder shall carry out the Battery Sizing calculation for both

500kV & 220kV equipment to determine the actual requirement. In result if the actual requirement is more than the said minimum requirement of battery and battery chargers, the contractor/bidder will supply the batteries and battery charger as per actual requirement within the same quoted price and no additional payment will be made in this respect. The bidders are required to mention the price in Schedule of Prices for battery and chargers accordingly. For battery sizing calculation, DC Load of two complete Dias for each 500kV and 220kV Switchyard shall also be considered for future extensions.

- Telecom equipment, 48V DC battery & battery charger
- All other panels necessary for successful/smooth operation of the grid station

e) Laying and connection of all cables for A.C. and D.C. distribution systems for auxiliaries of plant involved in the scope of work.

f) Laying in trenches and connection of all control cables, for control and protection systems.

g) Necessary interconnection/ interfacing wiring of all switchyard and indoors equipment as per specification drawings and approved protection scheme.

h) In case of Extension work, all interconnection/interface wiring/cabling with the existing panels/equipment in substation and supply of material/equipment in this respect is also included in scope of work. NGC will not supply any equipment/material for this purpose.

i) Providing pre-commissioning test protocol and completion of the pre-testing and commissioning activities as per the approved test protocol.

j) Assist the manufacturer (s) during guarantee periods

k) To provide technical staff, labor, contractor's equipment and consumables in testing and commissioning of all Plant and accessories for satisfactory operation.

8. Design & Supply of soft (in Auto CAD & PDF) & hard copies of AC/DC Schematic & interconnection/interface wiring diagrams along with terminal plans & cable schedule complete in all respect that shall include but not limited to the following;

   a. Protection Panels, Bay Control Panels Plus Bay Mimic Panels, Local Control Cubicles, Switchyard equipment etc. (i.e. CTs, PTs, Circuit Breaker, Isolator, Earth Switch etc.).
   b. All other necessary schematic & interconnection wiring diagrams.
   c. Factory As-Built Drawings of all above items (a, b after attending all the discrepancies / shortcomings communicated by the office of C.E (P&C) NGC during design stage & during FAT.
   d. Final Site As-Built drawings of all above items (a, b, c) after energization of Bays.
   e. Parallel operation of Auto Transformers.

9. Handing over of all surplus goods and materials after completion of work for which the contractor has taken payment from the employer.

10. The quantities for both electrical and civil work have been indicated in the schedule of prices. Single line diagrams, switchyard layouts and other relevant drawings will also help in understanding the scope of work for the substations.

11. All vehicles, to be supplied as per Schedule of Prices, shall be new, unused, right-hand drive, of the latest model with automatic security system. Prices quoted shall include the cost of vehicles, tax, registration (in favour of Employer) of vehicles, comprehensive insurance up to the end of Defects Liability Period or for three (3) years from the date of purchase, whichever is later from a reputable insurance company, transportation up to the designated offices of the Employer and the Project Manager.

12. Any other work not mentioned above but deemed necessary by the contractor/Employer/Project Manager for the completion of the work and its successful/smooth operation will be considered a part of the scope of work under the contract.

NOTES:

I. Drawings showing general layout of Substation equipment, Single Line Diagrams and other details of indoor and outdoor equipment, Civil and electro-mechanical works etc. are contained in Volume – III of these Bidding Documents. These drawings elaborate the Scope of work and for general guidance of the Bidder. Detailed Design and drawings shall be prepared and submitted by the Contractor for approval as per Clause 20 of GC of these Bidding Documents.

II. The Contractor shall not execute any Electrical/Civil/Mechanical work without prior approval of the Project Manager. The drawings provided in Volume-III of this tender are for reference only. Before execution of any work, the Contractor shall prepare the relevant drawing and get the approval from the Project Manager.

III. The control house building and generator room drawings mentioned in the Price Schedules and provided in the Volume-III of this tender are for reference purpose only with reference to the accommodation/ facilities/ required inner dimensions while engineering design of the building shall be done by the Contractor which shall be aesthetic and fulfilling all given requirements.

IV. Foundations design drawings for equipment and other allied structures mentioned in Schedules of Rates & Prices and provided in volume-III of this bidding document are for reference purpose only regarding general shape of structure, the Contractor/ Bidder is required to design the equipment foundations as per loads and specifications of the proposed/ procured equipment and all other allied structures as per site requirements in accordance with the Geotechnical Investigation Report and by following the Building Code of Pakistan (Seismic Provisions-2007)

V. The quantities mentioned in the Schedules of Rates & Prices, Section-III are estimated quantities. Those quantities are to be used for bid evaluation purpose only. The actual quantities may vary depending upon the approved drawings. However, the unit rates for material, equipment and service quoted in Schedules of Rates & Prices shall remain firm and final.

VI. NGC will not supply any equipment / goods/ material, which is to be installed / erected at the site.

VII. Design & Project Management of the project is a part of the scope. As such the contractor will prepare all the relevant drawings. These drawings shall not be used for execution of the works without prior approval of the Employer/Project Manager.

VIII. NGC shall not give any equipment / T&P for survey, civil works, and erection to the contractor for this project and the same shall have to be arranged by the contractor.

IX. The detail of equipment/T&P, which the bidder possesses or to be arranged must be furnished with the bid.

X. In case the contractor/bidder fails to arrange / import the required equipment / T&P in healthy condition for inspection at site within one month prior to commencement of respective activity of the project schedule, NGC has the right, in addition to withhold current payments, to terminate the contract at any stage and to get executed the balance work through other contractors at the said contractor's risk and cost.

12 Protection and Control Technical Provisions :

i. NGC Specification **P-204:2025** shall be followed for Protection, Control, Monitoring, Recording & Automation equipment/Panels of the said grid station. The quantity of equipment for Relay, Control, BCU, SAS equipment & other miscellaneous equipment(s)/Panels given in the specification describes the tentative requirement & minimum benchmark. Additional material/equipment, if required to complete the scheme & make it functional as per scope of work at grid station, shall also be provided by the bidder without any additional cost.

ii. The Bidder shall be responsible for complete design, supply, interconnections, wiring, cabling, terminations required for installation, erection, interfacing, testing & commissioning of complete Secondary equipment/panels/system. It is clarified that all the wiring and interconnections (i.e. Cable laying, termination, testing & commissioning) from main control cabinet of primary equipment (CT/PT marshalling boxes, Transformers LCCs/ACP/Motor drive units/OLTC, CBs/Isolators/Earth Switches LCC etc.) up to Secondary equipment (BCU control Panel, relay panels, SAS equipment/panels, AC/DC Auxiliary services system, 11kV system & fault recorders etc.) are part of this tender.

iii. All SAS equipment(s), IEDs, Metering & recording equipment, etc. shall have fiber optic interfaces and standard protocol compliant with IEC 61850 ed.2 and IEC 62439-3 PRP to facilitate data communication with the station control system.

iv. All the protection equipment/relays shall be of EU/USA/Canada origin only. Each IED to be installed in the Substation shall be of NGC-approved make & type; otherwise, the same shall be Type Tested from independent accredited labs such as KEMA/DNVGL or equivalent as per NGC specification and certificate/report of the same shall be submitted at the time of bid submission.

v. The bidder shall provide IEC61850 ed. 2 & IEC62439-3 PRP compliance KEMA/DNVGL certificates/reports along with IEC61850 ed. 2 interoperability certificates from User International Group against each IEDs, Ethernet Switches & SAS software etc. at the time of bid submission.

vi. SAS manufacturer shall be responsible for design, supply, installation, testing, commissioning and configuration of SAS. Also, the SAS manufacturer shall provide & install all necessary Fiber Optic cables, FO connectors with allied

accessories, laying, installation, splicing, terminations etc. complete in all respects. The SAS manufacturer shall also be responsible for Programming, Testing & Commissioning, along with factory acceptance tests (FATs), Site acceptance tests (SATs), of all substation automation system (SAS) related equipment that includes but not limited to equipment such as BCUs (Signals & Software Interlocking etc.), Workstations (operations, measurements, signals, controls, & interlocks etc.), Engineer Workstations, GPS Equipment, Fault Recorders, Relay IEDs, etc. given in the technical data and BOQ items given in the relevant NGC specifications.

vii. SAS-related IEDs and SAS HMI software/configurators shall preferably be from the Protection IED manufacturer to mitigate IEC61850 interoperability communication conflicts.

viii. Each BCU Panel, SAS panel, Relay panel, FR panel, etc. shall be provided with an Optical Distribution Frame/Cassette for connection with Ethernet Switches via multi-core fiber optic cables and for connecting with IEDs using single-core fiber optic cable. Further, the Bidder shall submit detailed FO terminal/routing plan and schedules along with calculations as per complete scope of work entailing the requirement, quantity, line length and type of Fiber Optic cables for review and approval.

ix. Bidder / Contractor shall submit detail plan entailing features & functionalities of SAS HMI for review and approval before configuration/implementation in operator and engineering workstations to meet NGC requirements.

x. Integration of Substation Automation System (SAS) for subject scope of work with existing SAS at 500kV Faisalabad West Grid Station.

a. The Contractor shall be responsible for the complete integration of the Substation Automation System (SAS) associated with the subject extension works with the existing SAS system of the substation. The integration shall be carried out in a manner that ensures seamless, reliable, and fully functional operation of the existing and newly installed systems as a single integrated SAS.

b. The scope shall include, but not be limited to, engineering, configuration, supply of required hardware/software, communication interfaces, modification/upgradation of existing SAS equipment and software, database expansion, signal mapping, HMI/SCADA modifications, communication network configuration, protection and control signal integration, interlocking logic, time synchronization, event/alarm management, disturbance/event recording, and all associated accessories and services required for complete integration.

c. The Contractor shall ensure that all new Intelligent Electronic Devices (IEDs), protection relays, bay control units, meters, RTUs/gateways, communication equipment and other SAS components provided under the extension works are fully compatible with the existing SAS architecture, communication protocols and engineering environment.

d. All required modifications to the existing SAS, including but not limited to configuration files, databases, HMI/SCADA graphics, alarm and event lists, communication parameters, control logic, interlocking schemes, user access/configuration and system displays, shall be carried out by the Contractor in coordination with the existing SAS manufacturer/system integrator, where applicable.

e. The Contractor shall obtain all necessary licenses, software upgrades, engineering tools, communication drivers, protocol licenses and other proprietary items required for successful integration. No additional cost shall be payable for any item or activity necessary to achieve complete and satisfactory integration.

f. The Contractor shall conduct Factory Acceptance Tests (FAT), Site Acceptance Tests (SAT), point-to-point checks, communication tests, functional tests, interlocking tests, alarm/event verification, time synchronization checks and end-to-end integration tests to demonstrate satisfactory operation of the complete integrated SAS.

g. The integration work shall be planned and executed in such a manner as to minimize interruption to the operation of the existing substation. Any required shutdown, outage or modification of the existing SAS shall be coordinated with the Employer/Engineer and carried out only with prior approval.

h. Upon completion, the Contractor shall submit updated SAS configuration/database files, as-built drawings, communication architecture, signal lists, I/O lists, updated HMI/SCADA graphics, configuration and backup files, test reports, software/licenses and complete operation and maintenance documentation reflecting the final integrated system.

i. The Contractor shall be fully responsible for the satisfactory performance of the integrated SAS, including the existing and newly added portions affected by the integration works, and shall rectify any integration-related deficiencies identified during testing, commissioning, or the applicable warranty/defect liability period at no additional cost to the Employer.

xi. The expenditures of FATs/SATs/training, i.e., hotel accommodation charges, Travelling Allowance/Daily Allowance, Boarding & lodging charges shall be borne by the contractor/supplier.

xii. Bidder shall provide a scheme in the R15 panel for 500 kV system and in the R5 panel for 220 kV system, for clearance of End-zone fault, and necessary lockout tripping relays shall be installed accordingly. Further, the Bidder shall install 02 nos. self-reset tripping relays in case of the line breaker for sending DTT send signal to the remote end.

xiii. Integration of New 220 kV Diameters and 500kV Diameters with Existing 220 kV and 500kV Busbar/Breaker Failure Scheme etc., at Ludewala and Faisalabad West Grid Station respectively.

a. The Contractor shall be responsible for the complete engineering, design review, modification, integration, testing and commissioning of the subject 220 kV diameter(s) with the existing 220 kV busbar scheme of the substation. The integration shall be carried out in accordance with the approved protection, control, metering, interlocking and operational philosophy of the existing substation.

b. The Contractor shall thoroughly review the existing 220 kV busbar arrangement, bus coupler/bus sectionalizer arrangement, busbar protection scheme, bay control and protection systems, interlocking logic,

disconnector/isolator arrangements, CTs/VTs, trip and close circuits, control interfaces and existing SCADA configuration prior to commencement of the works.

c. The scope shall include complete engineering and detailed design for integration of the new 220 kV diameter(s) with the existing busbar scheme, including protection, control, metering, interlocking, synchronizing, annunciation and operational interfaces.
d. The new 220 kV diameter(s) shall be fully incorporated into the existing 220 kV busbar protection scheme, including all required CT inputs, isolator/disconnector status signals, bus selection logic, trip outputs, blocking signals, check-zone arrangements and associated protection logic.
e. The Contractor shall ensure that all required 220 kV busbar disconnector/isolator status indications are correctly wired, configured and made available to the busbar protection system for accurate and reliable dynamic bus-zone selection.
f. All CT circuits associated with the subject diameter(s), including protection and metering cores, shall be properly integrated with the existing protection systems. The Contractor shall verify CT ratios, classes, burden, polarity, wiring, earthing and circuit continuity and shall ensure suitability for the existing busbar protection and other protection schemes.
g. The new diameter(s) shall be fully integrated with the existing control and interlocking scheme. All necessary electrical and software interlocks between circuit breakers, disconnectors/isolators and earthing switches shall be implemented, tested and demonstrated.
h. All protection trip signals, breaker failure initiation, breaker failure trip outputs, intertripping, busbar protection trip signals, lockout functions and other relevant protection interfaces shall be integrated with the existing scheme and tested for correct operation.
i. All status, alarm, measurement, protection and control signals associated with the new 220 kV diameter(s) shall be integrated into the existing Substation Automation System (SAS)/SCADA, including HMI graphics, bay control, alarm/event lists, SOE and relevant databases.
j. Any modification required in existing protection panels, busbar protection panels, control panels, relay panels, SAS/SCADA system, communication system, marshalling panels, terminal blocks, wiring or associated equipment for successful integration shall be carried out by the Contractor.
k. The Contractor shall plan and execute the integration works to minimize interruption to the existing 220 kV busbar and substation operation. Any required shutdown, isolation or outage shall be coordinated with and approved by the Employer/Engineer before execution.
l. The Contractor shall carry out complete testing and commissioning of the integrated arrangement, including point-to-point checks, CT circuit checks, protection functional tests, busbar protection zone-selection tests, interlocking tests, breaker failure tests, trip circuit tests, control tests, SAS/SCADA checks and end-to-end functional testing.
m. Prior to energization of the new diameter(s), the Contractor shall demonstrate through approved testing that the busbar protection correctly identifies the applicable bus zone and operates correctly for all relevant fault and switching conditions without unwanted tripping of healthy bus sections/bays.
n. Upon completion, the Contractor shall submit updated single-line diagrams, protection schematics, AC/DC wiring diagrams, interlocking logic diagrams, CT/VT schedules, protection settings, busbar protection configuration, signal lists, SAS/SCADA databases, cable schedules, test reports and as-built drawings reflecting the final integrated arrangement.
o. The Contractor shall be fully responsible for the safe, reliable and satisfactory operation of the subject 220 kV diameter(s) and their integration with the existing 220 kV busbar scheme. Any deficiency or malfunction arising from the integration works and identified during testing, commissioning or the applicable warranty/defect liability period shall be rectified by the Contractor at no additional cost to the Employer.

xiv. Differential Protection Set-I and Set-II for 500/220 kV and 220/132kV Auto-Transformer shall be of different Make and Type. Similarly, 500kV and 220kV Line Distance Protection Relays Set-I and Set-II shall be of different Make and Type.

xv. Common annunciation circuit of alarm function i.e. DC Hooter, DC Siren & AC Bell shall be provided in common control panel.

xvi. All Protection schemes such as Breaker Failure Initiate, AR Initiate/Block, Tripping of Circuit Breakers, etc. shall be hardwired.

xvii. Battery Chargers, AC/DC auxiliary supply system/equipment (DC Battery Earth Leakage Relays, DC feeders earth leakage relays, AC/DC Under/Over Voltage Relays, AC/DC MCB trips, MCB/MCCBs ON/OFF status, Device Faulty signals etc.), protection relays, BCUs, Fault recorder IEDs, Panel AC/DC supply failure etc. related common signals or any other signal deemed necessary shall be wired to common BCU panel for Alarm and transfer of data to SAS and remote SCADA.

xviii. The Fault Recorder/Automatic Transient Recording Oscillograph shall be provided for complete scope of work including future bays at Ludewala Grid station. The minimum quantity of analogue input (CT/VT) and digital inputs shall be calculated and provided as per NGC Specification P-2024:2025 including spare: -

All CT & VT analogue inputs shall be wired via test blocks to FR IEDs, and it shall be ensured that CT & PT of the same bay shall be wired on the same test block & FR IED.

xix. Fault Recorder IEDs shall be IEC 61850 ed.2 & IEC 62439-3 PRP, IEEE1588 PTP, and IEEE C37.118.1a-2014 compliant for communication/data transfer to SAS system. The minimum sampling frequency rate for fault recorder equipment shall be at least 12.8 kHz or 256 samples per cycle. Fault Recorder equipment shall be triggered by IEDs via GOOSE preferably. However, if there is any possibility that Fault Recorder equipment cannot be triggered via GOOSE then adequate no. of digital input cards (with at least 15% spare Digital inputs) shall be provided as per approved signal list for triggering of Fault Recorder System without any additional cost. All reports shall be stored in Fault Recorder data base & SAS system data base in Bay/feeder wise folders with proper time stampings. An independent workstation shall also be provided and installed in Fault Recorder panel.

xx. All AC & DC Auxiliary Supply Panels shall be provided as per specified requirements laid down in the tender document, concept/logic diagrams in Volume-III & Technical Schedule **-** for AC/DC Auxiliary Supply Systems, which will override NGC Specification P-48:81. Moreover, surge arrestors of at least 2kV ratings shall be installed on a per-phase basis on each AC Incoming Supply. AC Reverse Power Relays shall be installed on AC Incoming 1 & 2 and Generator Incoming Auxiliary supplies for 500kV systems. However, for all other issues like DC emergency section & other material shall be provided as per specified requirements laid down in NGC Specifications P-48:81. **Further, Alarm signals from AC/DC Panels from 500kV, 220kV system shall be wired at digital inputs of common BCU panels for data transfer & event recording in Station Control System.** Further, the following requirements shall also be fulfilled in AC/DC Auxiliary Supply Panels:

- All AC Incoming Main Circuit Breakers for 500kV, 220kV systems shall be 3-pole, 415 V and Tie Circuit Breakers shall be 4-pole, 415 V and shall have continuous rated capacity of at least **1000A** at 60º centigrade, short circuit breaking capacity at least 36kA for 1sec and making capacity at least 72kA for 1sec. Overload setting range shall be 50% - 120% of rated value.
- For 220V DC system, all DC Incoming Main Circuit Breakers shall be 2-pole, 220V DC, continuous rated capacity of **400A**, short circuit breaking capacity at least 55kA for 1sec and making capacity at least 105kA for 1sec. Overload setting range shall be 50% - 120% of rated value.
- Each outgoing DC MCB to be connected with DC feeder shall be provided with core balance current transformer (CBCT)/DC sensors and shall be connected to earth leakage detection controller unit/relay for detection of earth leakage or ground fault current in each DC outgoing auxiliary services feeder.
- Signal collector units or individual earth leakage device(s) (12, 24, 32 or 64 channels) to be provided for collection of leakage current data from individual CBCT/DC Sensors and transfer to Earth leakage detection controller unit/ relay/system for detection of ground fault or leakage in any DC circuit for Alarm or Trip feeder wise based on individual parameter settings as per requirement of user. HMI shall also be installed on DC outgoing Panel for visualization of earth leakage currents in individual outgoing DC feeders.
- Earth leakage detection controller unit/ relay for DC1 & DC2 supplies be provided and shall be compatible with CBCT and signal collector units.

xxi. 415/240V AC-I & II Auxiliary Supply Panels shall be provided with both manual & automatic change over facility utilizing two 11kV sources (one from Auxiliary Transformer and one from another grid-station) and independent feeder from Diesel Generator set for 500kV and 220kV system separately. The 10% of below mentioned AC MCBs shall be provided as spare in AC panels. The tentative minimum quantity of outgoing AC MCBs in 415/240V AC-I & II Auxiliary Supply Panels at Ludewala and Faisalabad West G/s shall be as follows:

Ludewala G/s Upgradation:

For 500kV System			
AC Bus-I		**AC Bus-II**	
Amp Rating	Quantity	Amp Rating	Quantity
16 Amp	20	16 Amp	20
32 Amp	06	32 Amp	06
63 Amp	04	63 Amp	04
125 Amp	02	100 Amp	02
For 220kV System			
AC Bus-I		**AC Bus-II**	
Amp Rating	Quantity	Amp Rating	Quantity
16 Amp	12	16 Amp	12
32 Amp	07	32 Amp	07
63 Amp	02	63 Amp	02
125 Amp	01	100 Amp	01
Faisalabad West G/s Extension: -**For 500kV System**			
AC Bus-I		**AC Bus-II**	
Amp Rating	Quantity	Amp Rating	Quantity
16 Amp	06	16 Amp	06
32 Amp	04	32 Amp	04
63 Amp	02	63 Amp	02

For 500kV System			
125 Amp	01	100 Amp	01

xxii. 220V DC-I & DC-II Auxiliary Supply Panels with both manual & automatic change over facility shall be provided for 500kV, 220kV system separately. The 10% of below mentioned DC MCBs shall be provided as spare in DC panels. The tentative minimum quantity of outgoing DC MCBs in 220V DC-I & II Auxiliary Supply Panels for 500kV and 220kV system at Ludewala and Faisalabad West G/s shall be as under:

Ludewala G/s: -

For 500kV System			
220V DC Bus-I		**220V DC Bus-II**	
Amp Rating	Quantity	Amp Rating	Quantity
16 Amp	61	16 Amp	61
32 Amp	06	32 Amp	06
63 Amp	04	63 Amp	04
For 220kV System			
220V DC Bus-I		**220V DC Bus-II**	
16 Amp	16	16 Amp	16
32 Amp	02	32 Amp	02
63 Amp	01	63 Amp	01

Faisalabad West G/s:

For 500kV System			
220V DC Bus-I		**220V DC Bus-II**	
Amp Rating	Quantity	Amp Rating	Quantity
16 Amp	21	16 Amp	21
32 Amp	02	32 Amp	02
63 Amp	01	63 Amp	01

xxiii. ELCB with sensitive earth fault protection shall be installed in Relay, BCU & Fault Recorder panels for AC power sockets.

xxiv. DC surge protection devices shall be installed in panels for safety of IEDs & Ethernet Switches.

xxv. For 500/220kV Autotransformer(s), AVR shall be interfaced with SAS for On-Load tap changer control/operations via. AVR, BCU (itself) or Station Computer or SCADA; can transfer tap changer position & tap changer operation feedback data to control center/SCADA and shall be able to fulfill Auto Transformer parallel operations (i.e. Master, Follower, independent operation modes/ schemes) and Auto/ Manual control Tap Changer schemes. Moreover, winding temperature, oil temperature measured values, Fan operational status data/ information to station computer shall be made available on SAS HMI. It shall be possible to carry out / execute Fan control operations from the Station computer as well as from Transformer AVR panel. For this purpose, signals shall be wired in associated BCUs. Overcurrent & Earth Fault Relays for 11 kV Incoming & Outgoing Panels shall be Feeder Management/BCPU with protection features shall be as per NGC specification P44:2018 (amended to date) and shall be IEC61850 ed. 2 & IEC62439-3 PRP compliant with redundant FO ports for communication with SAS.

xxvi. Arc Flash feature shall be provided in Overcurrent & Earth Fault Protection Relay installed in each 11kV Incoming & 11kV Outgoing Panels along with three sensors at appropriate locations.

xxvii. The provision of two outgoing feeders from the emergency generator shall be kept in view to feed two independent AC Auxiliary supply panels for each 500kV and 220kV systems.

xxviii. Surge protection equipment (SPDs) shall also be installed in Substation Automation System (SAS) such as Bay level Ethernet Panel, Station Interface Panel etc. for safety of SAS equipment.

xxix. Redundant GPS Clock/Equipment along with allied accessories connected with Station level Ethernet Switches Set I & II in IEC62439-3 PRP connections be provided that shall not only cover existing 500kV and 220kV system scope of work as well as future scope of work at Ludewala and Faisalabad West Grid Stations. More, GPS system shall be complaint with IEEE1588 PTP, and IEEE C37.118.1a-2014 protocols.

xxx. All relevant NGC Specifications & all the technical requirements laid down in Tender documents shall be followed in true letter & spirit and no excuse whatsoever shall be accepted.

13 Provisions for Telecom-related Equipment (Gateway)

I. Gateway System

a. A redundant Gateway system shall be installed at 500kv G/S Ludewala for secure and reliable exchange of SCADA data between the Substation Automation System (SAS) and the designated remote SCADA interfaces (NPCC Islamabad and BCC Jamshoro) through the NGC Telecom Network. In addition, the existing Gateway system at 500kV Faisalabad West shall be modified and reconfigured to accommodate the additional SCADA signals associated with the two-bay extension towards Ludewala.

b. The Gateway(s) shall be part of the Substation Automation System (SAS). It shall enable local station control via Industrial PC, employing a human-machine interface (HMI) and control software package, performing the necessary system control and data acquisition functions.

c. The Contractor shall be responsible for the design, supply, installation, configuration, testing and commissioning of the standalone Gateway system in 1+1 redundant configuration at 500kV G/S Ludewala, complete with Gateway servers, firewall, software, licenses, communication interfaces and all necessary accessories, such that the system is fully functional with the SAS at 500kV G/S Ludewala.

d. For the two-bay extension at 500kV Faisalabad West, the Contractor shall modify and reconfigure the existing Gateway, including Gateway database expansion, signal/point configuration and provision of any required hardware, software, licenses, communication interfaces and accessories, to accommodate and transmit all additional approved SCADA signals associated with the extension works.

e. The Gateway systems shall provide reliable acquisition and transmission of approved SCADA information from the respective SAS to the designated remote interfaces through the applicable communication protocols. The Contractor shall carry out complete Gateway database configuration and signal mapping in accordance with the respective approved I/O Signal Lists.

f. Both Gateway systems shall have adequate processing, storage, communication and software capacity to accommodate the approved signal lists and future additions/modifications with minimum system modification. All required software licenses, configuration files, database backup facilities, maintenance and user manuals shall be provided.

g. Integration of the received SCADA data into the ISMO SCADA/EMS system, including modification of ISMO-side database, VDU/mimic displays, servers, software and licenses, shall be the responsibility of ISMO and shall not form part of the Contractor’s scope.

II Gateway Redundancy and Diagnostics

The Gateway system shall comprise two independent Gateway servers in 1+1 hot-standby redundant configuration, with automatic failover between the active and standby servers without loss of required SCADA functionality.

The Gateway shall provide redundant databases, operating system/software and communication interfaces as applicable to the proposed architecture. The system shall continuously monitor the health/status of both Gateway servers and associated communication interfaces.

Comprehensive hardware and software diagnostic facilities shall be provided to identify faults in the Gateway system. Gateway faults, communication failures and abnormal conditions shall be annunciated through the applicable station monitoring system and event/alarm facilities.

The Gateway shall provide facilities for database backup, restoration, configuration management and recovery.

III. Communication interfaces:

The Gateway controller shall supply all necessary hardware for connection of gateway with the communication equipment. For communication with NPCC & BCC SCADA/EMS redundant RS-232 and RJ-45 Ethernet ports shall be provided in the Gateway controller for connection to duplicated data channels. The selection of a communication path to the Gateway controller shall be controlled by the SCADA/EMS at NPCC (National Power Control Center), Islamabad & BCC (Backup Control Center), Jamshoro.

For communicating with IEDs, the Gateway controller shall be provided with four configurable serial ports with option for RS 232 and RS 485 interfaces. The serial interfaces shall individually select and support a data rate up to 38400 bps using 4-wire, full-duplex communications.

Each Gateway shall be provided with two sets of redundant IEC62439-3 PRP compliant GBPS FO ports for connection with each redundant station level ethernet Switches in PRP connections.The Gateway Controller shall support the following communications protocols:

- IEC 60870-5-104 to communicate with the SCADA/EMS (both standby and backup)
- IEC 60870-5-101 to communicate with the SCADA/EMS
- IEC 61850 to communicate with IEDs via Ethernet Switches

The Contractor shall provide and implement the communication protocols for each communication port in the Gateway controller. The Employer shall be authorized to disclose the Gateway protocol implementation to third-party suppliers of the Employer equipment.

The Contractor shall provide and implement all required communication protocols, drivers, licenses and configuration for the Gateway.

The Gateway shall provide appropriate communication redundancy and shall support the required number of independent communication channels/interfaces.

IV. Signal List Preparation and Approval for Ludewala and Faisalabad West

a. The Contractor shall prepare the complete SCADA I/O Signal List for 500KV G/S Ludewala in the prescribed format of ISMO, based on the approved SAS design, SLDs, protection/control schemes and tele-information/tele-operation requirements.

b. The Contractor shall prepare the revised SCADA I/O Signal List for the two-bay extension at 500kV Faisalabad West towards Ludewala, incorporating all additional SCADA signals associated with the extension works, in the prescribed ISMO format.

c. The Contractor shall submit the prepared/revised SCADA I/O Signal Lists to the Executive Director (ISMO) through the Engineer/Employer for review and approval.

d. The Contractor shall incorporate all comments/observations of ISMO and resubmit the revised Signal Lists until final approval by the Executive Director (ISMO).

e. The approved Signal Lists shall form the basis for Gateway database configuration, SCADA signal mapping and subsequent local and end-to-end testing.

V. SCADA Testing Works at 500kv G/S Ludewala and Faisalabad West

a. The Contractor shall carry out local testing of all approved SCADA signals at the Gateway in coordination P&C, Telecom and other relevant stakeholders.

b. The Contractor shall carry out end-to-end testing of 100% of the approved SCADA signals from 500 G/S Ludewala up to the designated remote interface at ISMO NPCC Islamabad and BCC Jamshoro, as applicable, through the NGC Telecom Network and under actual field conditions.

c. The Contractor shall also configure and test the additional SCADA signals associated with the two new bays at 500kV Faisalabad West in the existing Gateway, in accordance with the approved I/O Signal List. Local and end-to-end testing of these additional signals shall be carried out up to the designated remote interfaces.

d. The Contractor shall rectify all deficiencies related to its Gateway configuration, hardware, software, database and communication interfaces identified during testing and commissioning.

e. The Contractor shall provide complete Gateway configuration files, database backups, software/licenses, 14manuals, as-built documentation and necessary training to NGC personnel in accordance with the relevant training requirements.

VI. Data Trail through NGC Telecom Network

NGC field operations North and South shall provide the required data trail through the NGC Telecom Network for transmission of SCADA data from:

- 500kv G/S Ludewala to ISMO NPCC Islamabad and BCC Jamshoro; and
- 500kv Faisalabad West to ISMO NPCC Islamabad and BCC Jamshoro for the additional SCADA signals associated with the two-bay extension towards Ludewala.

VII. Gateway Interface with NGC Telecom Equipment

The interfacing of the Gateway with the NGC Telecom equipment, including DPLC and SDH equipment, at 500kv G/S Ludewala and 500kV Faisalabad West, as applicable, shall be the responsibility of the Contractor.

The Contractor shall provide all necessary hardware, software, interface modules, SFPs/transceivers, cables, patch cords, connectors, configuration and accessories required for complete and functional interfacing of the Gateway with the available DPLC/SDH communication equipment.

The Contractor shall ensure compatibility of the Gateway interfaces with the existing/new DPLC and SDH equipment and shall carry out all necessary configuration and interfacing works at the Gateway end. Any additional interface equipment or accessories required at the Contractor's end for successful communication shall be included in the Contractor's scope.

The Contractor shall demonstrate successful communication over the provided Telecom data trail during the specified local and end-to-end testing

14. Technical Provisions for Civil Works and Steel Structures:

i. The Contractor shall be responsible for the complete design, engineering, construction, testing and completion of all civil and structural works required, including all ancillary works necessary for satisfactory operation and commissioning.

ii. The drawings provided for civil works are for reference only. The Contractor shall submit detailed designs/drawings, model files, and design calculations for all civil and structural works for review and approval, in accordance with actual site conditions, applicable codes, standards, specifications, approved design criteria, and project requirements.

iii. The drawings of steel structures provided in bidding document are for reference only. The manufacturer/contractor shall prepare and submit the drawings for steel structures for approval with following information/data/drawings:

- Structure Model (Steel Support Structures, Gantries, Columns, Beams etc) using PLS Tower (latest version).
- Sag-Tension Calculations (Performed on Either ALCOA SAG 10 or PLS CADD latest Version)
- Short Circuit Forces
- Loading Trees of Steel Support Structures and Gantries etc.
- Connection Designs
- Fabrication/Assembly drawings of Steel Support Structures, Gantries, Columns, Beams etc

iv. The Contractor shall submit the PLS Tower models of the existing 220 kV gantries(Busbar-I &II alongwith allied if any) to facilitate verification of their structural adequacy, compatibility, and safety in accordance with the proposed upgradation requirements of the 220 kV switchyard. If any gantry or beam is found structurally inadequate or unsafe, the necessary strengthening shall be designed and executed by the Contractor in accordance with Schedule-4.

v. All civil works, including architectural and structural works for the Control House Building (CHB), Generator Room, equipment foundations, gantries, steel support structures, cable trenches, switchyard fence/gates, fire protection walls, drainage, water supply, sewerage and allied structures etc., shall be designed considering the Geotechnical Investigation Report and applicable provisions of the Building Code of Pakistan (Seismic Provisions-2007), ACI/ASTM and other relevant standards. The Energy Conservation Building Code (2023) shall be complied with for buildings/structures, where applicable.

vi. The Contractor shall carry out all necessary site clearing, excavation, dewatering, leveling/grading, earth filling, compaction, slope protection, backfilling and disposal of surplus excavated material. Finished levels shall ensure proper drainage and shall consider existing ground levels, flood levels, roads, equipment foundations and future extensions.

vii. Equipment foundations shall be designed and constructed considering equipment loads, operational/dynamic forces, seismic and wind effects, soil conditions and manufacturer's requirements, and shall be executed strictly as per approved drawings.

viii. Foundations for gantries and other steel support structures shall be designed and constructed considering applicable structural loads and soil parameters. Steel structures shall be erected in accordance with approved drawings after the foundations have achieved the required strength.

ix. Cable trenches, draw pits and culverts shall be constructed as per approved drawings, including cable supports, hangers, trays, risers, sleeves and other required provisions. Switchyard trenches shall have suitable longitudinal slopes and drainage arrangements to prevent accumulation of rainwater.

x. The CHB and Generator Room shall be constructed complete with foundations, structural works, architectural finishes, cable trenches, risers, hangers, trays, openings, waterproofing and all allied works as per approved drawings.

xi. Driveways, walkways, transformer ways, access roads/paths, switchyard fencing and gates shall be constructed as per approved drawings. Roads and paths shall consider switchyard slopes, drainage, future extension, movement of transformers and required clearances from equipment.

xii. A complete surface drainage system, including drains, catch pits, culverts and outfalls and pumping arrangements, shall be provided based on-site levels, rainfall/runoff and disposal requirements. Oil-water separation and associated containment arrangements shall be provided for transformers/reactors as required.

xiii. Fire protection walls/barriers and other required civil provisions shall be constructed in accordance with approved drawings and applicable fire-safety requirements.

xiv. Water supply, sewerage and associated civil works, including tanks, chambers, manholes and disposal arrangements, shall be provided as required for the Grid Station facilities.

xv. The switchyard shall be properly graded, compacted and surfaced with approved gravel of specified thickness. All civil works shall be coordinated with electrical, protection, control, communication and other disciplines to ensure proper equipment clearances, cable routing and interface requirements.

xvi. All materials and workmanship shall comply with the approved specifications and applicable standards. Required inspection, testing, quality-control records and concrete/material test reports shall be maintained.

xvii. Upon completion, the Contractor shall submit complete as-built drawings, design calculations, editable model files and other relevant documentation as required.

2. Specifications (Technical Specifications)

1. General

1.1 All designs, equipment, materials and workmanship shall comply with and be tested in accordance with requirements of the specifications. Equipment or parts, which are not covered by the specifications, shall comply with rules, codes and regulations of the International Electro-Technical Commission (IEC) or approved National Standardizing bodies.

1.2 The general intent of these specifications is to require the supply of equipment and materials equal or superior to those actually described herein. Unless otherwise stated, reference to the brand or manufacture, if made is only for the sake of comparison as to type, design, character or quality of the equipment and materials desired and shall not be interpreted as eliminating other equipment and materials of equal performance, quality and durability.

1.3 **Environmental, Health and Safety Management Plan (EHSMP)**

Within one month, after mobilization the qualified contractor shall submit an EHSMP commensurate with the proposed scope of works outlined in above sections.

The EHSMP must include, but not be limited to, mitigation measures to manage the following key Environmental, Health, and Safety risks:

i. Air Quality: Mitigation of dust and emissions from construction activities, transportation, and machinery operation to ensure compliance with air quality standards and reduce health risks to workers and nearby communities.

ii. Water Management: Proper management of water resources, including measures to prevent contamination of water bodies, manage wastewater, and ensure safe disposal of sewage and other effluents in line with environmental regulations.

iii. Noise Pollution: Control of noise levels from machinery, construction activities, and transportation to minimize disturbance to local communities and wildlife, and to prevent hearing damage for workers.

iv. Waste Management: Implementation of waste management strategies, including the safe disposal, recycling, or reuse of construction waste, hazardous materials, and domestic waste, ensuring minimal environmental impact.

v. Soil Erosion and Contamination: Measures to control soil erosion during construction, protect topsoil, and prevent contamination from chemicals, oils, or construction runoff that could impact surrounding ecosystems and agriculture.

vi. Health and Safety: Provision of personal protective equipment (PPE) for workers, ensuring safe working conditions, and addressing potential hazards such as slips, trips, falls, and exposure to harmful substances. Additionally, implementing a robust health and safety program to prevent accidents and manage any emergencies.

vii. Biodiversity Protection: Identification and mitigation of potential impacts on local ecosystems, flora, and fauna, especially in sensitive areas, ensuring that the construction activities do not harm biodiversity or disrupt ecological balance.

viii. Community Health and Safety: Ensuring safety measures for the local community, such as secure fencing of construction sites, traffic management plans, and emergency response plans to address potential accidents that could affect surrounding populations.

ix. Hazardous Materials Handling: Safe management, storage, and disposal of hazardous materials such as chemicals, fuels, and oils to prevent accidents, spills, or contamination of the environment.

x. Cultural Heritage Protection: Ensuring that construction activities do not disturb or damage any cultural heritage sites, practices, or monuments, with appropriate measures in place if such sites are identified.

The EHSMP must be fully compliant with national laws and international best practices to ensure a comprehensive approach to environmental, health, and safety management throughout the project lifecycle.

2. SPECIFICATIONS AND DRAWING

2.1 The contract shall be executed in strict conformity with the specifications and/or Drawings given or mentioned in this section and the supplier shall do no ‘Work’ without proper specifications, instructions and/or Drawings.

2.2 The Employer shall interpret the meaning of the Specification, data, drawing etc, and shall have a right to reject or accept any work or material which in his assessment does not meet the requirements of the Specification and/or applicable National and International standards, codes, rules, etc. mentioned elsewhere in the specification.

2.3 Specifications and/or drawings are intended to complement each other so that if anything is shown on the drawings as required but not mentioned in the specifications or vice versa, or in the event of conflict between any two clauses of the Specification/document of different codes/ standards specified or provided with the document, the more stringent requirement as per interpretation of the Employer apply, unless confirmed otherwise by the Employer in writing based on a written request from the Contractor.

2.4 If any errors, omissions or discrepancies are found in the figures, specifications and/or drawings or, if any feature shall appear to the supplier to be indefinite or unclear, the same shall be referred to the Employer whose written explanation and/or clarification shall be obtained before proceeding with the work.

2.5 The Contractor shall submit to Project Manager, for its approval, four (4) copies of all drawings technical literature, data, operation and maintenance instruction books and/or manuals required under the specifications and such other documents as required in the Technical Specifications or other provisions of the bidding documents or, if Employer deems necessary, require changes or modifications to be made therein, Employer shall return two copies to the Contractor/Manufacturer marked. “Approved”, “Approved as Noted” or “Returned for Correction”. Each drawing, which is noted “Returned for Correction” has to be resubmitted for approval after incorporation of the desired changes.

2.6 The Contractor/Manufacturer after incorporating the desired changes in the drawing shall resubmit four (4) sets of the same to the Employer for approval. Two prints of which shall be stamped “APPROVED” by the Employer and returned to the Contractor/Manufacturer for his record.

2.7 On completion of the Contract the Contractor / Manufacturer shall deliver to the Employer four (4) prints of all approved drawings, technical literature, data which show the work in the final or “as built” condition. The said

drawings and documents shall be permanent and non-fadable. In addition to above, two soft copies of above-mentioned final drawings made on AutoCAD (latest version) on two separate CDs shall also be provided to the Employer and the Project Manager.

2.8 The Contractor/Manufacturer shall allow 21 days for the Employer's approval of drawings in his schedule of work and in the time allowed for completion of the Contract. Extra time required for approval of drawings due to deficiencies in design or errors in submitted drawings shall be the responsibility of the Contractor/Manufacturer and no extension in time will be allowed on this account.

2.9 All drawings and documents furnished by the Contractor/Manufacturer in accordance with the Contract shall become the property of the Employer.

2.10 Wherever reference is made in the Technical Specifications to specific standards and codes to be met by the goods and materials to be furnished or tested, the provisions of the latest current edition or revision of the relevant standards or codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or relates to a particular country or regions, other authoritative standards that ensure substantial equivalence to the standards and codes specified will be acceptable.

3 LANGUAGE

3.1 All correspondence, literature, drawings, name plates, diagrams, applicable data, equipment details, instructions and maintenance books and manuals, spare parts, books and descriptive data shall be in the English language.

4 TYPE TESTS REQUIREMENTS

4.1 The bidder shall offer type tested equipment/material as per NGC latest Type Test Policy **(a soft copy of NGC Type Test Policy is provided in Volume-II of this bidding document)**. If the submitted type test reports are incomplete/not acceptable or the equipment is not previously type tested as per NGC type test policy, the type tests shall be carried out in line with this type test policy without change in cost and completion time.

4.3 The Type Test Reports shall include the complete information regarding outsourced components/ parts of the equipment type tested. The Report shall also include complete identification of the equipment along with drawings stamped by the concerned lab.

4.4 All Type Test Certificate, reference list, etc. shall be in English language.

4.5 The Bidder shall submit an unconditional Undertaking duly signed and stamped by bidder duly supported by manufacturer(s) in bid that in case of award of contract if submitted type test reports are not according to Clause 4, Subsection-2(Specifications) of Section-9 (Technical Provisions), he will carry out type tests as per requirement mentioned in said clause within the quoted Bid price and without affecting the delivery/ completion period as mentioned in the Bidding Documents. In case of failure to submit an Undertaking of type tests/ along with the bid or in response to post bid clarification, such manufacturer shall not be accepted and bidder will be bound to replace the same with acceptable manufacturer. In case of noncompliance, the bid shall be rejected.

4.6 Within 30 days from signing of contract, the contractor shall submit schedule of type testing from lab.

4.7 After award of contract, the bidder shall be required to perform requisite type tests before delivery of equipment without affecting the delivery/completion period as mentioned in the Bidding Document with in the quoted bid price. In case of delay or non-compliance of the said requirement, NGC reserves the right to cancel the contract agreement including encashment of performance guarantee and initiate the process for blacklisting as per NGC SOP for blacklisting.

4.8 The offered plant/equipment, not covered in NGC's Type Test Policy, shall be type tested as per relevant NGC specification.

5. <u>Specifications</u>

5.1 List of relevant NGC standard specifications for Equipment and other hardware items is given herein below. Detail specifications are provided in Volume II.

LIS OF SPECIFICATIONS		
A - Substation		
Sr. No.	**Specification Title**	**Spec No.**
1.	500kV Auto Transformer Bank	P-draft

2.	Nitrogen Injection explosion prevention and Fire protection system for auto-transformers	P-draft
3.	Online Condition Monitoring Equipment for Auto-Transformers	P-250:2023
4.	500kV Shunt Reactor	P-draft
5.	500kV and 220kV Alternating Current Circuit Breakers	P-171:2008 + Amendment
6.	Disconnector & Earthing Switch 550kV, 245kV, 145kV, 72.5kV & 36kV.	P-249:2020
7.	500kV and 220kV Current Transformers	P-174:2008
8.	500kV and 220kV Coupling Capacitor Voltage Transformer	P-draft
9.	220kV Capacitor Voltage Transformer	P-172:83
10.	Metal – Oxide Surge Arresters without Gaps (for 11KV, 33KV, 66KV, 132KV, 220KV & 500KV A.C. SYSTEMS)	P-181:2012 + Amendment
11.	Aluminum Tubing	P-134:2007
12.	Aluminum Stranded Conductor	P-63:2007
13.	Disc Type Porcelain Insulators (Ball and Socket Coupling Transmission Class)	P-8:2020
14.	Suspension Strings for Bundle Conductors for Grid Station	P-Draft
15.	Tension Strings for Bundle Conductors Bus for Grid Stations	P-Draft
16.	Connectors For 500/220/132 KV Grid Stations	P-176:2011
17.	Steel Nuts and Bolts (Inch Series)	P-19:1983
18.	Zinc Coatings	P-82:1981
19.	Fabrication Of Steel Structures	P-139:1980
20.	Earthing Platform	P-135:1980
21.	Transmission Line Earth wire Fittings	P-141:1980
22.	Galvanized steel wires	P-12:1980
23.	Supporting steel structures for grid station equipment	P-182:1991
24.	Plain Steel Washers	P-20:1968
25.	Steel Spring Washers	P-28:1968
26.	Energy Meters for Grid Metering	P-202:2012 + Amendment
27.	Metering Equipment for Electrical Energy Transfer Between Companies	P-199:2008
28.	Station Batteries	P-132:2019
29.	Charger For Station Batteries	P-133:1995
30.	HVAC And Fire Extinguishers	P-Draft
31.	11kV Metal Clad Switchgear	P-44:2018 + Amendment
32.	Control Cables	P-100:2022
33.	Sheathed Insulated Distribution Cable	DD-S-08-2007
34.	15,000 Volts XLPE Insulated Stranded Circular Compacted Aluminum/Copper Conductor Power Cables	P-29:2010
35.	Terminations For XLPE 11kv Power Cables	P-184:1986
36.	Copper Wire for Earthing	P-16:2023
37.	Earth Rod	P-116:1981
38.	Thermite Joints for Substation Earthing	P-114:1982
39.	Earthing And Lightning Protection	P-Draft
40.	Diesel Generating Sets (250, 625 & 1250 kVA)	P-161:1981
41.	Grid Station Lighting	P-Draft

42.	Three Phase Pad mounted 11,000/415 Volts Transformers	P-41:1981
43.	Erection, Testing & Commissioning	P-Draft
44.	Civil Works	P-Draft
45.	Lattice Steel Poles	P-34:1968
46.	Steel Structures	Section-5
B – Protection		
47.	Specification for 765/500/220/132kV Protection, Control, Metering, Monitoring, Recording & Automation System	P-204: 2025
48.	AC and DC Auxiliary Services Panels	P-48: 81
C - Telecom		
49.	Technical Specifications of Gateway	TEL-GW-REV-02 Dated 01.07.2026
50.	Digital Power Line Carrier System (DPLC) Specification	TEL-DPLC-REV-01 Dated 01.07.2026
51.	Optical Line Terminal Equipment (OLTE) Specification	TEL-OLTE-REV-01 Dated 01.07.2026
52.	Specification for Telephone System (PAX, TELEPHONE & MDF)	TEL-TS-REV-01 Dated 01.07.2026
53.	Technical Specification for 48V Battery Charger	TEL-BC-REV-01 Dated 01.07.2026
54.	Technical Specification for 48V Battery	TEL-BATTERY-REV-01 Dated 01.07.2026

5.2 The specification mentioned above shall apply. The requirements indicated in subsequent clause 5.3 to onward shall also have to be met. In case any requirement given in the said clauses differs from that given in the main specification, the requirement given herein shall prevail.

5.3 All the equipment shall have continuous and short circuit current rating as specified in Schedule of Prices. In case the equipment rating defined in specification is different from the rating mentioned in description in Schedule of Prices, the later shall prevail.

5.4 In Schedule of Prices wherever extended creepage distance is required/mentioned, it shall be taken as 31mm/kV.

5.5 For 500kV Current Transformers one measuring core will be of 15VA(on all taps/ratio) and each of protection cores will be of 30VA(at lowest tap/ratio).

5.6 For Post Insulator stack IEC-60273 shall be followed.

5.7 The Auto/Power transformers shall be equipped with bushing CT's as following:

S. #	Description	CT Ratio
1	500/220 kV Bushing CTs (500 kV Side)	3000-2500-2000-1200/1A
2	500/220 kV Bushing CTs (220 kV Side)	3000-2500-2000-1200/1A
3	500/220 kV Bushing CTs (Neutral Side)	3000-2500-2000-1200/1A
4	500/220 kV Bushing CTs (Tertiary Winding)	4500-3000/1A

The above-mentioned CT ratios are for tendering purpose only. The exact ratio will be confirmed at technical data approval stage and the bidder will supply the CTs accordingly within award price and delivery time.

5.8 Following requirements relating to the tertiary winding and tertiary bus bars shall be considered:

5.8.1 The auto-transformers shall have stabilizing tertiary windings designed to limit voltage unbalance when the main load is asymmetrical, to suppress harmonics, to allow sufficient earth fault current to flow for operation of protective gear and stabilizing winding shall have reactance suitable to limit the circulating currents to avoid overheating of windings.

5.8.2 Tertiary windings shall be capable of withstanding the current resulting from any of the system faults. Windings temperature shall not exceed the maximum permitted value under any of the system fault conditions (including line-to-neutral faults) and under the most stringent loading conditions of HV / LV (including full single phase loading) windings so as to avoid overheating of tertiary windings, causing damage to its insulation.

5.8.3 The minimum insulation level of Um=36kV (one step higher) for the 23kV tertiary winding shall be used. Therefore, the data provided in Table-1 in NGC Specification of 500kV Auto Transformer Bank may be read as follows:

7	**Rated highest voltage (insulation class), kV rms**	
	c) Tertiary Winding	36
10	Insulation Level	
	c) For tertiary winding:	
	i) Impulse withstand level, kV peak	200
	ii) Power frequency withstand level, kV rms	70

All other technical parameters and clearances shall be provided / given by manufacturer as per minimum insulation level of Um=36kV.

5.8.4 The minimum insulation level of Tertiary bushings will be 52kV instead of 24kV. Therefore, the data provided regarding Tertiary bushings in Table-1 in NGC Specification of 500kV Auto Transformer Bank may be read as follows:

21	**Bushing Ratings**	
	c) 52kV Tertiary Bushings:	
	i) Current rating, A, rms	4000
	ii) Impulse withstand level kV, peak	250
	iii) Power frequency withstand level, one-minute dry kV, rms	95
	iv) Power frequency withstand level, 10 sec. wet, kV, rms	95

5.8.5 The manufacturer shall submit the calculation for transferred overvoltage in the non-impulse winding based upon the winding capacitances and mutual inductance and shall ascertain that it will not damage the non-impulse winding. Detailed calculations shall be provided by manufacturer for the transferred surges in the tertiary winding of the auto-transformers in accordance with Appendix-B of IEC 60076-3. The manufacturer shall also suggest rating of the surge arresters for the tertiary winding (and surge capacitors, if required) as per the outcome of the study.

5.8.6 The tertiary winding shall be connected externally through insulated pipe to form the delta. The current rating of the same shall be verified/confirmed by the manufacturer keeping in view the requirements laid down in sub-clause 5.8.2 above.

5.8.7 One corner of Tertiary Delta Winding shall be grounding externally as per Appendix-B, IEC 60076-3.

5.8.8 The insulated bus bar for making delta shall be provided by the manufacturer, and it will be made sure that the insulation of bus-bar is specifically designed for outdoor usage, meeting the service conditions as mentioned in the transformer specification. Further, all the insulted bus-bars (pipes) should comply with requirement laid down for out-door Busbars under BS-159 “High Voltage Busbar and Busbars Connection” or equivalent IEC standards.

5.8.9 The insulation class of the insulated bus bar shall not be less than 52kV in any case; however, higher rating bus bar shall be supplied if the outcome of the study i.e. transferred overvoltage in tertiary winding require so, as mentioned in sub-clause 5.8.5 above.

5.8.10 The manufacturer shall use non-metallic material like fiber glass for bus bar clamping structure and in the cable box where pipe enter of exit the box. Further proper rubber sleeves/rubber boots shall be used where the pipe/Busbar come in the contact with metallic parts e.g. clamping structure / cable box. The detail drawing for bus bar interconnection including clamping structure material and arrangement shall be supplied for the approval of the employer.

5.8.11 It will be ensured that no magnetic path shall be formed in clamping structures and cable box and any metallic part in the vicinity of the tertiary bus bars.

5.9 Red lead should be forbidden from epoxy primer as per requirement in clause 5.10 of Auto Transformer specifications.

5.10 Environment friendly water-based coating without solvents shall be used to ensure low VOC emissions as per requirement in clause 5.10 of Auto Transformer specifications.

5.11 The conservator should be positioned so as not to restrict access to the bushings and equipment as per requirement in clause 6.11 of Auto Transformer specifications. It must be placed either on the roof of the tank, or at the end of the tank on the side opposite the tertiary bushings. Its positioning must not hinder access to the tap changer if it exists.

5.12 Following accessory is added in clause 6 of Auto Transformer specifications.

5.13 Steel ladder with safety guard: The transformer shall be fitted with a steel ladder to provide ease during erection, testing and maintenance of the transformers. Protective devices shall be provided with the ladder to restrain climbing when transformer is energized. Safety railing equipment shall also be designed and supplied for temporary installation during de-energized state to provide perimeter fall protection for personnel on the tank cover.

6. Schedule of Technical Data

Schedules of technical data regarding all major equipment/material, to be installed at the Grid Station, are provided in the specifications which are included in Volume-II. Whereas, the schedule of technical data for some equipment is separately attached in Volume II. The bidder is required to fill the requisite schedules of technical data and submit the same with the bid. The technical data provided with the bid shall be regarded as reference to evaluation and future record.

3. Drawings

Please refer to **Volume III (in soft form)**.

Volume-II can be downloaded from the below mentioned Google Drive link:

https://drive.google.com/drive/folders/105gsuWyiWIGiJrnghjTTSJxy3Ezri7GX?usp=sharing

Volume-III can be downloaded from the below mentioned Google Drive link:

https://drive.google.com/drive/folders/1f8sMP_ywqzS5MWJeO9iNyZqegmhlpJox?usp=drive_link