PROCUREMENT DOCUMENT

Request for Bids
Goods

(Single Stage Two-Envelope Bidding Process)

Establishment of Data Center Infrastructure at Islamabad and Lahore

(Supply and Installation along with related services)

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(Two-Envelope Bidding Process)

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RFB No: 1(7)Addl.Dir(P&F)/PO/2023 (PK-FBR-402370-GO-RFB)
Project: Pakistan Raises Revenue Program
Purchaser: Federal Board of Revenue (FBR)
Country: Pakistan
Issued on: 12th February, 2024

Procurement Document

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Section I - Instructions to Bidders

A. General

1. Scope of Bid

1.1 In connection with the Specific Procurement Notice, Request for Bids (RFB), specified **in the Bid Data Sheet (BDS),** the Purchaser, as specified **in the BDS,** issues this bidding document for the supply of Goods and, if applicable, any Related Services incidental thereto, as specified in Section VII, Schedule of Requirements. The name, identification and number of lots (contracts) of this RFB are specified **in the BDS.**

1.2 Throughout this bidding document:

(a) the term "in writing" means communicated in written form (e.g. by mail, e-mail, fax, including, if **specified in the BDS**, distributed or received through the electronic-procurement system used by the Purchaser), with proof of receipt;

(b) if the context so requires, "singular" means "plural" and vice versa; and

(c) "Day" means calendar day, unless otherwise specified as "Business Day". A Business Day is any day that is an official working day of the Borrower. It excludes the Borrower's official public holidays.

2. Source of Funds

2.1 The Borrower or Recipient (hereinafter called "Borrower") specified **in the BDS** has applied for or received financing (hereinafter called "funds") from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called "the Bank") in an amount specified **in the BDS,** toward the project named **in the BDS.** The Borrower intends to apply a portion of the funds to eligible payments under the contract for which this bidding document is issued.

2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank in accordance with the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the loan account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).

3. Fraud and Corruption

3.1 The Bank requires compliance with the Bank's Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework, as set forth in Section VI, Fraud and Corruption.

3.2 In further pursuance of this policy, bidders shall permit and shall cause their agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit the Bank to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Bidders

4.1 A Bidder may be a firm that is a private entity, a state-owned enterprise or institution (subject to ITB 4.6), or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution. Unless

specified **in the BDS**, there is no limit on the number of members in a JV.

4.2 A Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this Bidding process, if the Bidder:

(a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or

(b) receives or has received any direct or indirect subsidy from another Bidder; or

(c) has the same legal representative as another Bidder; or

(d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the Bid of another Bidder, or influence the decisions of the Purchaser regarding this Bidding process; or

(e) or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or

(f) or any of its affiliates has been hired (or is proposed to be hired) by the Purchaser or Borrower for the Contract implementation; or

(g) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS reference ITB 2.1 (the name of the project), that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or

(h) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the

preparation of the bidding document or specifications of the Contract, and/or the Bid evaluation process of such Contract; or (ii) would be involved in the implementation or supervision of such Contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the Bidding process and execution of the Contract.

4.3 A firm that is a Bidder (either individually or as a JV member) shall not participate in more than one Bid, except for permitted alternative Bids. This includes participation as a subcontractor. Such participation shall result in the disqualification of all Bids in which the firm is involved. A firm that is not a Bidder or a JV member, may participate as a subcontractor in more than one Bid.

4.4 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.8. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or subconsultants for any part of the Contract including related Services.

4.5 A Bidder that has been sanctioned by the Bank, pursuant to the Bank's Anti-Corruption Guidelines, and in accordance with its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework as described in Section VI paragraph 2.2 d. shall be ineligible to be prequalified for, initially selected for, bid for, propose for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address specified in the BDS.

4.6 Bidders that are state-owned enterprises or institutions in the Purchaser's Country may be eligible to compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Bank, that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Purchaser.

4.7 A Bidder shall not be under suspension from Bidding by the Purchaser as the result of the operation of a Bid–Securing Declaration or Proposal-Securing Declaration.

4.8 Firms and individuals may be ineligible if so indicated in Section V, Eligible Countries, and:

(a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or

(b) 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, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.

4.9 A Bidder shall provide such documentary evidence of eligibility satisfactory to the Purchaser, as the Purchaser shall reasonably request.

4.10 A firm that is under a sanction of debarment by the Borrower from being awarded a contract is eligible to participate in this procurement, unless the Bank, at the Borrower's request, is satisfied that the debarment;

(a) relates to fraud or corruption; and

(b) followed a judicial or administrative proceeding that afforded the firm adequate due process.

5. Eligible Goods and Related Services

5.1 All the Goods and Related Services to be supplied under the Contract and financed by the Bank may

have their origin in any country in accordance with Section V, Eligible Countries.

5.2 For purposes of this ITB, the term "goods" includes commodities, raw material, machinery, equipment, and industrial plants; and "related services" includes services such as insurance, installation, training, and initial maintenance.

5.3 The term "origin" means the country where the goods have been mined, grown, cultivated, produced, manufactured or processed; or, through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

B. Contents of Request for Bids Document

6. Sections of Bidding Document

6.1 The bidding document consist of Parts 1, 2, and 3, which include all the sections indicated below, and should be read in conjunction with any addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

- Section I - Instructions to Bidders (ITB)
- Section II - Bidding Data Sheet (BDS)
- Section III - Evaluation and Qualification Criteria
- Section IV - Bidding Forms
- Section V - Eligible Countries
- Section VI - Fraud and Corruption

PART 2 Supply Requirements

- Section VII - Schedule of Requirements

PART 3 Contract

- Section VIII - General Conditions of Contract
- Section IX - Special Conditions of Contract
- Section X - Contract Forms

6.2 The Specific Procurement Notice - Request for Bids (RFB) issued by the Purchaser is not part of this bidding document.

6.3 Unless obtained directly from the Purchaser, the Purchaser is not responsible for the completeness of the document, responses to requests for clarification, the Minutes of the pre-Bid meeting (if any), or addenda to the bidding document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Purchaser shall prevail.

6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding document and to furnish with its Bid all information or documentation as is required by the bidding document.

7. Clarification of the Bidding Document

7.1 A Bidder requiring any clarification of the bidding document shall contact the Purchaser in writing at the Purchaser's address specified **in the BDS**. The Purchaser will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of Bids within a period specified **in the BDS.** The Purchaser shall forward copies of its response to all Bidders who have acquired the bidding document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so specified **in the BDS**, the Purchaser shall also promptly publish its response at the web page identified **in the BDS**. Should the clarification result in changes to the essential elements of the bidding document, the Purchaser shall amend the bidding document following the procedure under ITB 8 and ITB 22.2.

8. Amendment of Bidding Document

8.1 At any time prior to the deadline for submission of Bids, the Purchaser may amend the bidding document by issuing addenda.

8.2 Any addendum issued shall be part of the bidding document and shall be communicated in writing to all who have obtained the bidding document from the Purchaser in accordance with ITB 6.3. The Purchaser shall also promptly publish the

addendum on the Purchaser's web page in accordance with ITB 7.1.

8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2.

C. Preparation of Bids

9. Cost of Bidding

9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.

10. Language of Bid

10.1 The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Purchaser, shall be written in the language specified **in the BDS.** Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages into the language specified **in the BDS,** in which case, for purposes of interpretation of the Bid, such translation shall govern.

11. Documents comprising Bid

11.1 The Bid shall comprise two Parts, namely the Technical Part and the Financial Part. These two Parts shall be submitted simultaneously in two separate sealed envelopes (two-envelope Bidding process). One envelope shall contain only information relating to the Technical Part and the other, only information relating to the Financial Part. These two envelopes shall be enclosed in a separate sealed outer envelope marked "ORIGINAL BID".

11.2 The **Technical Part** shall contain the following:

(a) **Letter of Bid - Technical Part:** prepared in accordance with ITB 12;

(b) **Bid Security** or **Bid-Securing Declaration**: in accordance with ITB 19.1;

(c) **Alternative Bid - Technical Part**: if permissible in accordance with ITB 13, the Technical Part of any Alternative Bid;

(d) **Authorization**: written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.3;

(e) **Bidder's Eligibility**: documentary evidence in accordance with ITB 17 establishing the Bidder's eligibility to Bid;

(f) **Qualifications**: documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the Contract if its Bid is accepted;

(g) **Eligibility of Goods and Related Services**: documentary evidence in accordance with ITB 16, establishing the eligibility of the Goods and Related Services to be supplied by the Bidder;

(h) **Conformity**: documentary evidence in accordance with ITB 16, that the Goods and Related Services conform to the bidding document;

(i) any other document **required in the BDS.**

11.3 The **Financial Part** envelope shall contain the following:

(a) **Letter of Bid – Financial Part:** prepared in accordance with ITB 12 and ITB 14;

(b) **Price Schedules**: completed prepared in accordance with ITB 12 and ITB 14;

(c) **Alternative Bid - Financial Part;** if permissible in accordance with ITB 13, the Financial Part of any Alternative Bid;

(d) any other document **required in the BDS.**

11.4 The Technical Part shall not include any financial information related to the Bid price. Where material financial information related to the Bid price is contained in the Technical Part the Bid shall be declared non-responsive.

11.5 In addition to the requirements under ITB 11.2, Bids submitted by a JV shall include a copy of the

Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all members and submitted with the Bid, together with a copy of the proposed Agreement.

11.6 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

12. Letters of Bid

12.1. The Bidder shall prepare the Letter of Bid – Technical Part, and Letter of Bid – Financial Part using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.3. All blank spaces shall be filled in with the information requested.

13. Alternative Bids

13.1. Unless otherwise **specified in the BDS,** Alternative Bids shall not be considered.

14. Bid prices and Discounts

14.1 The prices and discounts quoted by the Bidder in the Letter of Bid - Financial Part and in the Price Schedules shall conform to the requirements specified below.

14.2 All lots (contracts) and items must be listed and priced separately in the Price Schedules.

14.3 The price to be quoted in the Letter of Bid - Financial Part, in accordance with ITB 12.1 shall be the total price of the Bid, excluding any discounts offered.

14.4 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid - Financial Part, in accordance with ITB 12.1.

14.5 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account, unless otherwise specified **in the BDS.** A Bid submitted with an adjustable price quotation shall be treated as nonresponsive and shall be rejected, pursuant to ITB 31. However, if in accordance with the BDS, prices quoted by the Bidder shall be subject

to adjustment during the performance of the Contract, a Bid submitted with a fixed price quotation shall not be rejected, but the price adjustment shall be treated as zero.

14.6 If so specified in ITB 1.1, Bids are being invited for individual lots (contracts) or for any combination of lots (packages). Unless otherwise specified **in the BDS,** prices quoted shall correspond to 100% of the items specified for each lot and to 100% of the quantities specified for each item of a lot. Bidders wishing to offer discounts for the award of more than one Contract shall specify in their Bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. **However, discounts that are conditional on the award of more that one lot will not be considered for bid evaluation purpose**.

14.7 The terms EXW, CIP, and other similar terms shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, as specified **in the BDS.**

14.8 Prices shall be quoted as specified in each Price Schedule included in Section IV, Bidding Forms. The disaggregation of price components is required solely for the purpose of facilitating the comparison of Bids by the Purchaser. This shall not in any way limit the Purchaser's right to contract on any of the terms offered. In quoting prices, the Bidder shall be free to use transportation through carriers registered in any eligible country, in accordance with Section V, Eligible Countries. Similarly, the Bidder may obtain insurance services from any eligible country in accordance with Section V, Eligible Countries. Prices shall be entered in the following manner:

(a) For Goods manufactured in the Purchaser's Country:

(i) the price of the Goods quoted EXW (ex-works, ex-factory, ex warehouse, ex showroom, or off-the-shelf, 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 the Goods;

(ii) any Purchaser's Country sales tax and other taxes which will be payable on the Goods if the Contract is awarded to the Bidder; and

(iii) the price for inland transportation, insurance, and other local services required to convey the Goods to their final destination (Project Site) specified **in the BDS.**

(b) For Goods manufactured outside the Purchaser's Country, to be imported:

(i) the price of the Goods, quoted CIP named place of destination, in the Purchaser's Country, as specified **in the BDS;**

(ii) the price for inland transportation, insurance, and other local services required to convey the Goods from the named place of destination to their final destination (Project Site) specified **in the BDS;**

(c) For Goods manufactured outside the Purchaser's Country, already imported:

(i) the price of the Goods, including the original import value of the Goods; plus any mark-up (or rebate); plus any other related local cost, and custom duties and other import taxes already paid or to be paid on the Goods already imported.

(ii) the custom duties and other import taxes already paid (need to be supported with documentary evidence) or to be paid on the Goods already imported;

(iii) the price of the Goods, obtained as the difference between (i) and (ii) above;

(iv) any Purchaser's Country sales and other taxes which will be payable on the Goods if the Contract is awarded to the Bidder; and

(v) the price for inland transportation, insurance, and other local services required to convey the Goods to their final destination (Project Site) specified **in the BDS.**

(d) for Related Services, other than inland transportation and other services required to convey the Goods to their final destination, whenever such Related Services are specified in the Schedule of Requirements:

(i) the price of each item comprising the Related Services (inclusive of any applicable taxes).

15. Currencies of Bid and Payment

15.1 The currency(ies) of the Bid and the currency(ies) of payments shall be the same. The Bidder shall quote in the currency of the Purchaser's Country the portion of the Bid price that corresponds to expenditures incurred in the currency of the Purchaser's country, unless otherwise specified **in the BDS.**

15.2 The Bidder may express the Bid price in any currency. If the Bidder wishes to be paid in a combination of amounts in different currencies, it may quote its price accordingly but shall use no more than three foreign currencies in addition to the currency of the Purchaser's Country.

16. Documents Establishing the Eligibility and Conformity of the Goods and Related Services

16.1 To establish the eligibility of the Goods and Related Services in accordance with ITB 5, Bidders shall complete the country of origin declarations in the Price Schedule Forms, included in Section IV, Bidding Forms.

16.2 To establish the conformity of the Goods and Related Services to the bidding document, the Bidder shall furnish as part of its Bid the documentary evidence that the Goods conform to the technical specifications and standards specified in Section VII, Schedule of Requirements.

16.3 The documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed item by item description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to the technical specification, and if applicable, a statement of deviations and exceptions to the provisions of the Section VII, Schedule of Requirements.

16.4 The Bidder shall also furnish a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods during the period specified **in the BDS** following commencement of the use of the goods by the Purchaser.

16.5 Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by the Purchaser in the Schedule of Requirements, are intended to be descriptive only and not restrictive. The Bidder may offer other standards of quality, brand names, and/or catalogue numbers, provided that it demonstrates, to the Purchaser's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified in the Section VII, Schedule of Requirements.

17. Documents Establishing the Eligibility and Qualifications of the Bidder

17.1 To establish Bidder's eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid – Technical Part, included in Section IV, Bidding Forms.

17.2 The documentary evidence of the Bidder's qualifications to perform the Contract, if its Bid is accepted, shall establish to the Purchaser's satisfaction:

(a) that, if required **in the BDS**, a Bidder that does not manufacture or produce the Goods it offers to supply shall submit the Manufacturer's Authorization using the form included in Section IV, Bidding Forms to demonstrate that it has been duly authorized by the manufacturer or producer of the Goods

to supply these Goods in the Purchaser's Country;

(b) that, if required **in the BDS**, in case of a Bidder not doing business within the Purchaser's Country, the Bidder is or will be (if awarded the Contract) represented by an Agent in the country equipped and able to carry out the Supplier's maintenance, repair and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications; and

(c) that the Bidder meets each of the qualification criterion specified in Section III, Evaluation and Qualification Criteria.

18. Period of Validity of Bids

18.1. Bids shall remain valid until the date **specified in the BDS** or any extended date if amended by the Purchaser in accordance with ITB 8. A Bid that is not valid until the date **specified in the BDS**, or any extended date if amended by the Purchaser in accordance with ITB 8, shall be rejected by the Purchaser as nonresponsive.

18.2. In exceptional circumstances, prior to the expiry of the Bid validity, the Purchaser may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a Bid Security is requested (in accordance with ITB 19), it shall also be extended for a corresponding period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its Bid, except as provided in ITB 18.3.

18.3. If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial Bid validity, the Contract price shall be determined as follows:

(a) In the case of fixed price contracts, the Contract price shall be the Bid price adjusted by the factor **specified in the BDS**.

(b) In the case of adjustable price contracts, no adjustment shall be made.

(c) In any case, Bid evaluation shall be based on the Bid price without taking into

consideration the applicable correction from those indicated above.

19. Bid Security

19.1. The Bidder shall furnish, as part of the Technical Part of its Bid, either a Bid-Securing Declaration or a Bid Security, as specified **in the BDS,** in original form and, in the case of a Bid security**,** in the amount and currency specified **in the BDS.**

19.2. A Bid Securing Declaration shall use the form included in Section IV, Bidding Forms.

19.3. If a Bid Security is specified pursuant to ITB 19.1, the Bid security shall be a demand guarantee in any of the following forms at the Bidder's option:

(a) an unconditional guarantee issued by a bank or non-bank financial institution (such as an insurance, bonding or surety company);

(b) an irrevocable letter of credit;

(c) a cashier's or certified check; or

(d) another security **specified in the BDS**,

from a reputable source from an eligible country. If an unconditional guarantee is issued by a non-bank financial institution located outside the Purchaser's Country the issuing non-bank financial institution shall have a correspondent financial institution located in the Purchaser's Country to make it enforceable unless the Purchaser has agreed in writing, prior to Bid submission, that a correspondent financial institution is not required. In the case of a bank guarantee, the Bid security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms, or in another substantially similar format approved by the Purchaser prior to Bid submission. The Bid security shall be valid for twenty-eight (28) days beyond the original date of expiry of the Bid validity, or beyond any extended date if requested under ITB 18.2.

19.4. If a Bid Security is specified pursuant to ITB 19.1, any Bid not accompanied by a substantially responsive Bid Security shall be rejected by the Purchaser as non-responsive.

19.5. If a Bid Security is specified pursuant to ITB 19.1, the Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the contract and furnishing the Performance Security pursuant to ITB 49.

19.6. The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.

19.7. The Bid Security may be forfeited:

(a) if a Bidder withdraws its Bid prior to the expiry date of Bid validity specified by the Bidder on the Letter of Bid or any extended date provided by the Bidder ; or

(b) if the successful Bidder fails to:

(i) sign the Contract in accordance with ITB 48; or

(ii) furnish a performance security in accordance with ITB 49.

19.8. The Bid Security or Bid-Securing Declaration of a JV must be in the name of the JV that submits the Bid. If the JV has not been legally constituted into a legally enforceable JV at the time of Bidding, the Bid security or Bid-Securing Declaration shall be in the names of all future members as named in the letter of intent referred to in ITB 4.1 and ITB 11.5.

19.9. If a Bid security is **not required in the BDS**, pursuant to ITB 19.1, and

(a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder on the Letter of Bid, or any extended date provided by the Bidder, or

(b) if the successful Bidder fails to: sign the Contract in accordance with ITB 48; or furnish a performance security in accordance with ITB 49;

the Borrower may, **if provided for in the BDS**, declare the Bidder ineligible to be awarded a

contract by the Purchaser for a period of time **as stated in the BDS**.

20. Format and Signing of Bid

20.1 The Bidder shall prepare the Bid, in accordance with ITB 11 and ITB 21.

20.2 Bidders shall mark as "CONFIDENTIAL" information in their Bids which is confidential to their business. This may include proprietary information, trade secrets, or commercial or financially sensitive information.

20.3 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation **as** specified **in the BDS** and shall be attached to the Bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid where entries or amendments have been made shall be signed or initialed by the person signing the Bid.

20.4 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.

20.5 Any inter-lineation, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

D. Submission of Bids

21. Sealing and Marking of Bids

21.1 The Bidder shall deliver the Bid in two separate, sealed **envelopes** (the Technical Part and the Financial Part). These two envelopes shall be enclosed in a sealed outer envelope marked "ORIGINAL BID".

21.2 In addition, the Bidder shall submit copies of the Bid in the number specified **in the BDS**. Copies of the Technical Part shall be placed in a separate sealed envelope marked "COPIES: TECHNICAL PART". Copies of the Financial Part shall be placed in a separate sealed envelope marked "COPIES: FINANCIAL PART". The Bidder shall place both of these envelopes in a separate, sealed outer envelope

marked "BID COPIES". In the event of any discrepancy between the original and the copies, the original shall prevail. If alternative Bids are permitted in accordance with ITB 13, the alternative Bids shall be submitted as follows: the original of the alternative Bid Technical Part shall be placed in a sealed envelope marked "ALTERNATIVE BID – TECHNICAL PART" and the Financial Part shall be placed in a sealed envelope marked "ALTERNATIVE BID – FINANCIAL PART" and these two separate sealed envelopes then enclosed within a sealed outer envelope marked "ALTERNATIVE BID – ORIGINAL", the copies of the alternative Bid will be placed in separate sealed envelopes marked "ALTERNATIVE BID – COPIES OF TECHNICAL PART", and "ALTERNATIVE BID – COPIES OF FINANCIAL PART" and enclosed in a separate sealed outer envelope marked "ALTERNATIVE BID - COPIES".

21.3 The envelopes marked "ORIGINAL BID" and "BID COPIES" (and, if appropriate, a third envelope marked "ALTERNATIVE BID") shall be enclosed in a separate sealed outer envelope for submission to the Purchaser.

21.4 All inner and outer envelopes, shall:

(a) bear the name and address of the Bidder;

(b) be addressed to the Purchaser in accordance with ITB 22.1;

(c) bear the specific identification of this Bidding process indicated in ITB 1.1; and

(d) bear a warning not to open before the time and date for Bid opening.

21.5 If all envelopes are not sealed and marked as required, the Purchaser will assume no responsibility for the misplacement or premature opening of the Bid.

22. Deadline for Submission of Bids

22.1. Bids must be received by the Purchaser at the address and no later than the date and time specified **in the BDS.** When so specified **in the BDS**, Bidders shall have the option of submitting their Bids electronically. Bidders submitting Bids

electronically shall follow the electronic Bid submission procedures specified **in the BDS**.

22.2. The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the bidding document in accordance with ITB 8, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

23.1. The Purchaser shall not consider any Bid that arrives after the deadline for submission of Bids, in accordance with ITB 23. Any Bid received by the Purchaser after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

24.1. A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization (the power of attorney) in accordance with ITB 20.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be:

(a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," or "MODIFICATION;" and

(b) received by the Purchaser prior to the deadline prescribed for submission of Bids, in accordance with ITB 22.

24.2. Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3. No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified by the Bidder on the Letter of Bid -Technical Part and repeated in

the Letter of Bid - Financial Part, or any extension thereof.

E. Public Opening of Technical Parts of Bids

25. Public Opening of Technical Parts of Bids

25.1. Except as in the cases specified in ITB 23 and ITB 24.2, the Purchaser shall, at this Bid opening, publicly open and read out, in accordance with this ITB, all bids received by the deadline at the date, time and place specified **in the BDS** in the presence of Bidders' designated representatives and anyone who chooses to attend. Any specific electronic Bid opening procedures required if electronic Bidding is permitted in accordance with ITB 22.1, shall be as specified **in the BDS.**

25.2. First, the written notice of withdrawal in the envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. If the withdrawal envelope does not contain a copy of the "power of attorney" confirming the signature as a person duly authorized to sign on behalf of the Bidder, the corresponding Bid will be opened. No Bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Bid opening.

25.3. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Bid opening.

25.4. Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening. Only Bids that are opened and read out at Bid opening shall be considered further.

25.5. Next, all other envelopes marked "TECHNICAL PART" shall be opened one at a time. All envelopes marked "FINANCIAL PART" shall remain sealed, and kept by the Purchaser in safe custody until they are opened, at a later public opening, following the evaluation of the Technical Part of the Bids. On opening the envelopes marked "TECHNICAL PART" the Purchaser shall read out: the name of the Bidder and whether there is a modification; and Alternative Bid the presence or absence of a Bid Security, if required and any other details as the Purchaser may consider appropriate.

25.6. Only Technical Parts of Bids and Alternative Bid - Technical Parts that are read out at Bid opening shall be considered further in the evaluation. The Letter of Bid – Technical Part and the separate sealed envelope marked "FINANCIAL PART" are to be initialed by representatives of the Purchaser attending Bid opening in the manner specified **in the BDS.**

25.7. At the Bid opening the Purchaser shall neither discuss the merits of any Bid nor reject any Bid (except for late Bids, in accordance with ITB 23.1).

25.8. Following the opening of the Technical Parts of the Bid the Purchaser shall prepare a record that shall include, as a minimum:

(a) the name of the Bidder and whether there is a withdrawal, substitution, or modification;

(b) the presence or absence of a duly sealed envelope marked "FINANCIAL PART";

(c) the presence or absence of a Bid Security or Bid-Securing Declaration; and

(d) if applicable, any Alternative Bid - Technical Part;

25.9. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

F. Evaluation of Bids - General Provisions

26. Confidentiality

26.1 Information relating to the evaluation of the Technical Part shall not be disclosed to Bidders or any other persons not officially concerned with the Bidding process until the notification of evaluation of the Technical Part in accordance with ITB 33. Information relating to the evaluation of Financial Part, the evaluation of combined Technical Part and Financial Part, and recommendation of contract award shall not be disclosed to Bidders or any other persons not officially concerned with the RFB process until the Notification of Intention to Award the Contract is transmitted to Bidders in accordance with ITB 43.

26.2 Any effort by a Bidder to influence the Purchaser in the evaluation or contract award decisions may result in the rejection of its Bid.

26.3 Notwithstanding ITB 26.2, from the time of Bid opening to the time of Contract Award, if any Bidder wishes to contact the Purchaser on any matter related to the Bidding process, it should do so in writing.

27. Clarification of Bids

27.1 To assist in the examination, evaluation, comparison of the Bids, and qualification of the Bidders, the Purchaser may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by the Purchaser shall not be considered. The Purchaser's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the Evaluation of the Bids, in accordance with ITB 35.

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

28. Deviations, Reservations, and Omissions

28.1 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

28.2 "Omission" is the failure to submit part or all of the information or documentation required in the bidding document.

29. Nonconformities, Errors and Omissions

29.1 Provided that a Bid is substantially responsive, the Purchaser may waive any nonconformities in the Bid.

29.2 Provided that a Bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

G. Evaluation of Technical Parts of Bids

30. Evaluation of Technical Parts

30.1 In evaluating the Technical Parts of each Bid, the Purchaser shall use the criteria and methodologies listed in ITB 31, ITB 32, the BDS, if applicable, and Section III, Evaluation and Qualification Criteria. No other evaluation criteria or methodologies shall be permitted.

31. Determination of Responsiveness

31.1 The Purchaser's determination of a Bid's responsiveness is to be based on the contents of the Bid itself, as defined in ITB 11. A substantially responsive Bid is one that meets the requirements of the bidding document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:

(a) if accepted, would:

(i) affect in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or

(ii) limit in any substantial way, inconsistent with the bidding document, the Purchaser's rights or the Bidder's obligations under the Contract; or

(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.

31.2 The Purchaser shall examine the technical aspects of the Bid submitted in accordance with ITB 16 and ITB 17, in particular, to confirm that all requirements of Section VII, Schedule of Requirements have been met without any material deviation or reservation, or omission.

31.3 If a Bid is not substantially responsive to the requirements of bidding document, it shall be rejected by the Purchaser and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

32. Qualification of the Bidders and Detailed Evaluation of the Technical Part

32.1 The Purchaser shall determine, to its satisfaction, whether all eligible Bidders, whose Bids have been determined to be substantially responsive to the bidding document, meet the Qualification Criteria specified in Section III, Evaluation and Qualification Criteria.

32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17. The determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than specialized subcontractors if permitted in the bidding document), or any other firm different from the Bidder.

32.3 Prior to Contract award, the Purchaser will verify that the successful Bidder (including each member of a JV) is not disqualified by the Bank due to noncompliance with contractual SEA/SH

prevention and response obligations. The Purchaser will conduct the same verification for each subcontractor proposed by the successful Bidder. If any proposed subcontractor does not meet the requirement, the Purchaser will require the Bidder to propose a replacement subcontractor.

32.4 Only substantially responsive bids submitted by eligible and qualified bidders shall proceed to the detailed technical evaluation to assess adequacy of the Technical Part followed by evaluation applying technical factors/subfactors and corresponding scores as specified in the BDS.

H. Notification of Evaluation of Technical Parts and Public Opening of Financial Parts of Bids

33. Notification of Evaluation of Technical Parts and Public Opening of Financial Parts

33.1 Following the completion of the evaluation of the Technical Parts of the Bids, and the Bank has issued its no objection (if applicable), the Purchaser shall notify in writing those Bidders who have failed to meet the Qualification Criteria and/or whose Bids were considered non-responsive to the requirements in the bidding document, advising them of the following information:

(a) the grounds on which their Technical Part of Bid failed to meet the requirements of the bidding document;

(b) their envelope marked "FINANCIAL PART" will be returned to them unopened after the completion of the bid evaluation process and the signing of the Contract;

(c) notify them of the date, time and location of the public opening of the envelopes marked 'FINANCIAL PART".

33.2 The Purchaser shall, simultaneously, notify in writing those Bidders whose Technical Parts have been evaluated as substantially responsive to the bidding document and met the Qualification Criteria, advising them of the following information:

(a) their Bid has been evaluated as substantially responsive to the bidding

document and met the Qualification Criteria; and

(b) their envelope marked "FINANCIAL PART" will be opened at the public opening of Financial Parts;

(c) notify them of the date, time and location of the public opening of the envelopes marked "FINANCIAL PART".

33.3 The opening date shall be not less than ten (10) Business Days from the date of notification of the results of the technical evaluation, specified in ITB 33.1 and 33.2. However, if the Purchaser receives a complaint on the results of the technical evaluation within the ten (10) Business Days, the opening date shall be subject to ITB 48.1. The Financial Part of the Bid shall be opened publicly in the presence of Bidders' designated representatives and anyone who chooses to attend.

33.4 At this public opening the Financial Parts will be opened by the Purchaser in the presence of Bidders, or their designated representatives and anyone else who chooses to attend. Bidders who met the Qualification Criteria and whose Bids were evaluated as substantially responsive will have their envelopes marked "FINANCIAL PART" opened at the second public opening. Each of these envelopes marked "FINANCIAL PART" shall be inspected to confirm that they have remained sealed and unopened. These envelopes shall then be opened by the Purchaser. The Purchaser shall read out the names of each Bidder, the technical score and the total Bid prices, per lot (contract) if applicable, including any discounts and Alternative Bid - Financial Part, and any other details as the Purchaser may consider appropriate.

33.5 Only envelopes of Financial Part of Bids, Financial Parts of Alternative Bids and discounts that are opened and read out at Bid opening shall be considered further for evaluation. The Letter of Bid - Financial Part and the Price Schedules are to be initialed by a representative of the Purchaser attending the Bid opening in the manner specified **in the BDS**.

33.6 The Purchaser shall neither discuss the merits of any Bid nor reject any envelopes marked "FINANCIAL PART".

33.7 The Purchaser shall prepare a record of the Financial Part of the Bid opening that shall include, as a minimum:

(a) the name of the Bidder whose Financial Part was opened;

(b) the Bid price, per lot (contract) if applicable, including any discounts,

(c) if applicable, any Alternative Bid - Financial Part.

33.8 The Bidders whose envelopes marked 'FINANCIAL PART" have been opened or their representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

I. Evaluation of Financial Parts of Bids

34. Evaluation of Financial Parts

34.1 Provided that a Bid is substantially responsive, the Purchaser 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, by adding the average price of the item or component quoted by substantially responsive Bidders. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Purchaser shall use its best estimate.

34.2 To evaluate the Financial Part of each Bid, the Purchaser shall consider the following:

(a) evaluation will be done for Items or Lots (contracts), as specified **in the BDS;** and the Bid Price as quoted in accordance with ITB 14;

(b) price adjustment for correction of arithmetic errors in accordance with ITB 35.1;

(c) price adjustment due to discounts offered in accordance with ITB 14.4;

(d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 36;

(e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 34.1; and

(f) the additional evaluation factors specified in Section III, Evaluation and Qualification Criteria.

34.3 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.

34.4 If this bidding document allows Bidders to quote separate prices for different lots (contracts), each lot will be evaluated separately to determine the Most Advantageous Bid using the methodology specified in Section III, Evaluation and Qualification Criteria. **Discounts that are conditional on the award of more than one lot or slice shall not be considered for Bid evaluation**.

34.5 The Purchaser's evaluation of a Bid will exclude and not take into account:

(a) in the case of Goods manufactured in the Purchaser's Country, sales and other similar taxes, which will be payable on the goods if a contract is awarded to the Bidder;

(b) in the case of Goods manufactured outside the Purchaser's Country, already imported or to be imported, customs duties and other import taxes levied on the imported Good, sales and other similar taxes, which will be payable on the Goods if the contract is awarded to the Bidder;

(c) any allowance for price adjustment during the period of execution of the contract, if provided in the Bid.

34.6 The Purchaser's evaluation of a Bid may require the consideration of other factors, in addition to the Bid price quoted in accordance with ITB 14.

These factors may be related to the characteristics, performance, and terms and conditions of purchase of the Goods and Related Services. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of Bids, unless otherwise specified **in the BDS** from amongst those set out in Section III, Evaluation and Qualification Criteria. The criteria and methodologies to be used shall be as specified in ITB 34.2 (f).

35. Correction of Arithmetic Errors

35.1 In evaluating the Financial Part of each Bid, the Purchaser shall correct arithmetic errors on the following basis:

(a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;

(b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

(c) 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 arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

35.2 Bidders shall be requested to accept correction of arithmetic errors. Failure to accept the correction in accordance with ITB 35.1, shall result in the rejection of the Bid.

36. Conversion to Single Currency

36.1 For evaluation and comparison purposes, the currency(ies) of the Bids shall be converted in a single currency as specified **in the BDS.**

37. Margin of Preference

37.1 Unless otherwise specified **in the BDS,** a margin of preference shall not apply.

38. Comparison of Financial Parts

38.1 The Purchaser shall compare the evaluated costs of the Bids to determine the Bid that has the lowest evaluated cost. The comparison shall be on the basis of CIP (place of final destination) prices for imported goods and EXW prices, plus cost of inland transportation and insurance to place of destination, for goods manufactured within the Borrower's country, together with prices for any required installation, training, commissioning and other services. The evaluation of prices shall not take into account custom duties and other taxes levied on imported goods quoted CIP and sales and similar taxes levied in connection with the sale or delivery of goods.

39. Abnormally Low Bids

39.1 An Abnormally Low Bid is one where the Bid price, in combination with other elements of the Bid, appears so low that it raises material concerns with the Purchaser as to the capability of the Bidder to perform the Contract for the offered Bid Price.

39.2 In the event of identification of a potentially Abnormally Low Bid, the Purchaser shall seek written clarification from the Bidder, including a detailed price analyses of its Bid price in relation to the subject matter of the contract, scope, delivery schedule, allocation of risks and responsibilities and any other requirements of the bidding document.

39.3 After evaluation of the price analyses, in the event that the Purchaser determines that the Bidder has failed to demonstrate its capability to perform the contract for the offered Bid price, the Purchaser shall reject the Bid.

J. Evaluation of Combined Technical and Financial Parts, Most Advantageous Bid and Notification of Intention to Award

40. Evaluation of combined Technical and Financial Parts

40.1 The Purchaser's evaluation of responsive Bids will take into account technical factors, in addition to cost factors in accordance with Section III

Evaluation and Qualification Criteria. The weight to be assigned for the Technical factors and cost is specified **in the BDS**. The Purchaser will rank the Bids based on the evaluated Bid score (B).

40.2 The Purchaser will determine the Most Advantageous Bid. The Most Advantageous Bid is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be substantially responsive to the Bidding document and is the Bid with the highest combined technical and financial score.

41. Purchaser's Right to Accept Any Bid, and to Reject Any or All Bids

41.1 The Purchaser reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids at any time prior to Contract Award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, Bid securities, shall be promptly returned to the Bidders.

42. Standstill Period

42.1 The Contract shall not be awarded earlier than the expiry of the Standstill Period. The Standstill Period shall be ten (10) Business Days unless extended in accordance with ITB 47. The Standstill Period commences the day after the date the Purchaser has transmitted to each Bidder the Notification of Intention to Award the Contract. Where only one Bid is submitted, or if this contract is in response to an emergency situation recognized by the Bank, the Standstill Period shall not apply.

43. Notification of Intention to Award

43.1 The Purchaser shall send to each Bidder (that has not already been notified that it has been unsuccessful) the Notification of Intention to Award the Contract to the successful Bidder. The Notification of Intention to Award shall contain, at a minimum, the following information:

(a) the name and address of the Bidder submitting the successful Bid;

(b) the Contract price of the successful Bid;

(c) the total combined score of the successful Bidder;

(d) the names of all Bidders who submitted Bids, and their Bid prices as readout, and as evaluated and technical scores;

(e) a statement of the reason(s) the Bid (of the unsuccessful Bidder to whom the notification is addressed) was unsuccessful;

(f) the expiry date of the Standstill Period;

(g) instructions on how to request a debriefing and/or submit a complaint during the standstill period.

K. Award of Contract

44. Award Criteria

44.1 Subject to ITB 41, the Purchaser shall award the Contract to the successful Bidder. This is the Bidder whose Bid has been determined to be the Most Advantageous Bid as specified in ITB 40.

45. Purchaser's Right to Vary Quantities at Time of Award

45.1 At the time the Contract is awarded, the Purchaser reserves the right to increase or decrease the quantity of Goods and Related Services originally specified in Section VII, Schedule of Requirements, provided this does not exceed the percentages **specified in the BDS,** and without any change in the unit prices or other terms and conditions of the Bid and the bidding document.

46. Notification of Award

46.1 Prior to the date of expiry of the Bid validity and upon expiry of the Standstill Period, specified in ITB 42.1 or any extension thereof, and upon satisfactorily addressing any complaint that has been filed within the Standstill Period, the Purchaser shall notify the successful Bidder, in writing, that its Bid has been accepted. The notification of award (hereinafter and in the Contract Forms called the "Letter of Acceptance") shall specify the sum that the Purchaser will pay the Supplier in consideration of the execution of the Contract (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price").

46.2 Within ten (10) Business Days after the date of transmission of the Letter of Acceptance, the Purchaser shall publish the Contract Award

Notice which shall contain, at a minimum, the following information:

(a) name and address of the Purchaser;

(b) name and reference number of the contract being awarded, and the selection method used;

(c) names of all Bidders that submitted Bids, and their Bid prices as read out at Bid opening, and as evaluated;

(d) names of all Bidders whose Bids were rejected either as nonresponsive or as not meeting qualification criteria, or were not evaluated, with the reasons therefor;

(e) the name of the successful Bidder, the final total contract price, the contract duration and a summary of its scope; and

(f) successful Bidder's Beneficial Ownership Disclosure Form.

46.3 The Contract Award Notice shall be published on the Purchaser's website with free access if available, or in at least one newspaper of national circulation in the Purchaser's Country, or in the official gazette. The Purchaser shall also publish the contract award notice in UNDB online.

46.4 Until a formal Contract is prepared and executed, the Letter of Acceptance shall constitute a binding Contract.

47. Debriefing by the Purchaser

47.1 On receipt of the Purchaser's Notification of Intention to Award referred to in ITB 43.1, an unsuccessful Bidder has three (3) Business Days to make a written request to the Purchaser for a debriefing. The Purchaser shall provide a debriefing to all unsuccessful Bidders whose request is received within this deadline.

47.2 Where a request for debriefing is received within the deadline, the Purchaser shall provide a debriefing within five (5) Business Days, unless the Purchaser decides, for justifiable reasons, to provide the debriefing outside this timeframe. In that case, the standstill period shall automatically be extended until five (5) Business Days after such debriefing is provided. If more than one

debriefing is so delayed, the standstill period shall not end earlier than five (5) Business Days after the last debriefing takes place. The Purchaser shall promptly inform, by the quickest means available, all Bidders of the extended standstill period

47.3 Where a request for debriefing is received by the Purchaser later than the three (3) Business Day deadline, the Purchaser should provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of Public Notice of Award of contract. Requests for debriefing received outside the three (3) day deadline shall not lead to extension of the standstill period.

47.4 Debriefings of unsuccessful Bidders may be done in writing or verbally. The Bidders shall bear their own costs of attending such a debriefing meeting.

48. Signing of Contract

48.1 The Purchaser shall send to the successful Bidder the Letter of Acceptance including the Contract Agreement, and a request to submit the Beneficial Ownership Disclosure Form providing additional information on its beneficial ownership. The Beneficial Ownership Disclosure Form shall be submitted within eight (8) Business Days of receiving this request.

48.2 The successful Bidder shall sign, date and return to the Purchaser, the Contract Agreement within twenty-eight (28) days of its receipt.

48.3 Notwithstanding ITB 48.2 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, where such export restrictions arise from trade regulations from a country supplying those products/goods, systems or services, the Bidder shall not be bound by its Bid, always provided however, that the Bidder can demonstrate to the satisfaction of the Purchaser and of the Bank that signing of the Contact Agreement has not been prevented by any lack of diligence on the part of the Bidder in completing any formalities, including

applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract.

49. Performance Security

49.1 Within twenty-eight (28) days of the receipt of the Letter of Acceptance from the Purchaser, the successful Bidder, if required, shall furnish the Performance Security in accordance with the GCC 18 using for that purpose the Performance Security Form included in Section X, Contract Forms, or another Form acceptable to the Purchaser. If the Performance Security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Purchaser. A foreign institution providing a bond shall have a correspondent financial institution located in the Purchaser's Country, unless the Purchaser has agreed in writing that a correspondent financial institution is not required.

49.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security. In that event the Purchaser may award the Contract to the Bidder offering the Most Advantageous Bid.

50. Procurement Related Complaint

50.1 The procedures for making a Procurement-related Complaint are as specified in the BDS.

Section II - Bid Data Sheet (BDS)

The following specific data for the Goods to be procured shall complement, supplement, and/or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

ITB Reference	**A. General**
ITB 1.1	The reference number of the Request for Bids (RFB) is **: 1(7)Addl.Dir(P&F)/PO/2023 (PK-FBR-402370-GO-RFB)** The Purchaser is: Federal Board of Revenue (FBR) The name of the RFB is: **Establishment of Data Center Infrastructure at Islamabad and Lahore (Supply and Installation along with related services)** The number and identification of lots (contracts) comprising this RFB is: **Not Applicable (Single Package)**
ITB 1.2(a)	Electronic-Procurement System: **Not Applicable**
ITB 2.1	The Borrower is: Federal Board of Revenue (FBR) Loan or Financing Agreement amount: **US$ 400 Million (US$ 80 Million (Component 2) and US$ 320 Million (Component 1)).** The name of the Project is: ***Pakistan Raises Revenue Program***
ITB 4.1	Maximum number of members in the Joint Venture (JV) shall be: three (03)_
ITB 4.5	A list of debarred firms and individuals is available on the Bank's external website: http://www.worldbank.org/debarr.
	B. Contents of Bidding Document
ITB 7.1	For **Clarification of Bid purposes** only, the Purchaser's address is: Attention: Director (Program Office) Address: FBR House, Constitution Avenue Floor/Room number*: Room No. 574, 5th Floor* City: *Islamabad* ZIP Code: 44000 Country: Pakistan

<table>
<tr><td></td><td>Telephone: 0092 51 9219649
Facsimile number: +92 (51) 9202673
Electronic mail address: director.prr@fbr.gov.pk
Requests for clarification should be received by the Purchaser no later than: 14 days prior to deadline for the bid submission date.
Web page: https://www.fbr.gov.pk

A Pre-bid meeting shall take place at the following date, time and place which a bidder may attend physically or virtually:

<table>
<tr><th>Date</th><th>27th February, 2024</th><th>Time</th><th>1030 hours (PST)</th></tr>
</table>
VENUE

CONFERENCE ROOM
Federal Board of Revenue,
FBR House, Constitutional Avenue,
Sector G-5/2,
Islamabad, Pakistan

<u>Virtual Meeting Link</u>:
Link: https://vlc.fbr.gov.pk/meeting/
ID: 884884
Password: 0577</td></tr>
<tr><td></td><td>C. Preparation of Bids</td></tr>
<tr><td>ITB 10.1</td><td>The language of the Bid is: English
All correspondence exchange shall be in English language.
Language for translation of supporting documents and printed literature is English.</td></tr>
<tr><td>ITB 11.2 (i) & 11.3 (d)</td><td>The Bidder shall submit the following additional documents in its Bid: None</td></tr>
<tr><td>ITB 13.1</td><td>Alternative Bids (Technical and Financial Parts): Not Applicable.</td></tr>
<tr><td>ITB 14.5</td><td>The prices quoted by the Bidder shall not be subject to adjustment during the performance of the Contract.</td></tr>
</table>

ITB 14.6	Prices quoted for entire package should correspond to **100 percent** of the quantities of the package.
ITB 14.7	The Incoterms edition is: **Incoterms 2020.**
ITB 14.8 (a)(iii), (b)(ii) and (c)(v)	Final Destination (Project Site): **Islamabad and Lahore.**
ITB 14.8 (b)(i)	Place of Destination: Islamabad and Lahore
ITB 15.1	The Bidder **is** required to quote in the currency of the Purchaser's Country: PKR
ITB 16.4	Period of time the Goods are expected to be functioning (for the purpose of spare parts): Seven (07) Years from the date of acceptance of Goods.
ITB 17.2 (a)	Manufacturer's authorization is: **Required**
ITB 17.2 (b)	After sales service is: **Required**
ITB 18.1	The Bid shall be valid until: 11th July, 2024.
ITB 18.3 (a)	The Bid price shall be adjusted by the following factor(s): Applicable KIBOR for PKR.
ITB 19.1	***A Bid Security of PKR 15,000,000/- in the form of Bank "Pay Order/Demand Draft / Call Deposit Receipt with ""Form of Bid Security Undertaking or ""Bank Guarantee shall be required.***
ITB 19.3 (d)	Other types of acceptable securities: None
ITB 19.9	Not Applicable
ITB 20.3	The written confirmation of authorization to sign on behalf of the Bidder shall consist of**: A board resolution or its equivalent, or notarized power of attorney specifying the representative's authority to sign the bid on behalf of, and to legally bind the bidder, shall be provided. If the bidder is an intended or an existing joint venture, the power of attorney should be signed by all partners and specify the authority of the named representative of the joint venture to sign on behalf of and legally bind the intended or existed joint venture partners. If the joint venture has not been formed, also include evidence from all proposed joint venture**

	partners of their intend to enter in to a joint venture in the event of contract award following ITB 11.
	D. Submission of Bids
ITB 21.2	In addition to the original of the Bid, the number of copies is**: One (01) hard copy and One (01) soft copy.**
ITB 22.1	For **Bid submission purposes** only, the Purchaser's address is: Attention: Director (Program Office) Address: FBR House, Constitution Avenue, Floor/ Room number: Room No. 574, 5th Floor City: Islamabad. ZIP/Postal Code: 44000 Country: Pakistan **The deadline for Bid submission is:** Date: **13th March, 2024** Time: 11:00 am Bidders ***shall not*** have the option of submitting their Bids electronically.
	E. Public Opening of Technical Parts of Bids
ITB 25.1	The Bid opening shall take place at: Address: FBR House, Constitution Avenue Floor/Room number: Room No. 574, 5th Floor City: Islamabad Country: Pakistan Date: **13th March, 2024** Time: Immediately after the deadline for submission of Bids. The electronic Bid opening procedures shall be: Not Applicable
ITB 25.6	The Letter of Bid - Technical Part and the sealed envelope marked "Second Envelope - Financial Part" shall be initialed by at least 03 authorized representatives of the Purchaser conducting Bid opening.
G. Evaluation of Technical Parts of Bids	
ITB 32.4	The technical factors and corresponding sub factors, to be applied for the evaluation of technical part of the bid of an eligible and qualified bidder

pursuant to the Evaluation and Qualification Criteria given in Section III, shall be:

S. No.	Requirement	Max. Score
1.	Bidder delivered OEM/ Manufacturer Datacenter solutions in last 10 years	10
2.	Product (Data center min of 10 IT racks) delivered by principal/OEM (Last ten (10) years)	10
3.	OEM local presence for support and parts availability.	10
4.	Relationship with OEM	10
5.	Product Compatibility	30
6.	Rated/Tier-III Compliance design (Both sites)	10
7.	Staff competence and relevance to the work	20

H. Notification of Evaluation of Technical Parts and Public Opening of Financial Parts of Bids

ITB 33.5

The Letter of Bid – Financial Part and the Price Schedules shall be initialed by Three (03) representatives of the Purchaser conducting Bid opening ***Each Financial Part of Bid shall be initialed by at least Three (03) representatives and shall be numbered, any modification to the unit or total price shall be initialed by the Representative of the Purchaser.***

I. Evaluation of Financial Part of Bids

ITB 34.2(a)

Evaluation will be done for: Complete Package ***"Bids will be evaluated on Complete Package basis. If a Price Schedule shows items listed but not priced, their prices shall be assumed to be included in the prices of other items. An item not listed in the Price Schedule shall be assumed to be not included in the Bid, and provided that the Bid is substantially responsive, the average price of the item quoted by substantially responsive Bidders will be added to the Bid price and the equivalent total cost of the Bid so determined will be used for price comparison."***

ITB 34.6

The adjustments shall be determined using the following criteria, from amongst those set out in Section III, Evaluation and Qualification Criteria:

	[refer to Section III, Evaluation and Qualification Criteria; insert complementary details if necessary] **(a)** Deviation in Delivery schedule: No **(b)** Deviation in payment schedule: No **(c)** the cost of major replacement component, mandatory spare parts, and service: No. **(d)** the availability in the Purchaser's Country of spare parts and after-sales services for the equipment offered in the Bid: No **(e)** Life cycle costs: the costs during the life of the goods or equipment: No **(f)** the performance and productivity of the equipment offered; No
ITB 36.1	Not Applicable
ITB 37.1	A margin of domestic preference ***shall not*** apply.
J. Evaluation of Combined Technical and Financial Parts and Most Advantageous Bid	
ITB 40.1	The weight for cost is: 70 %
	J. Award of Contract
ITB 45.1	The maximum percentage by which quantities may be increased is: 20% The maximum percentage by which quantities may be decreased is: 20%
ITB 50.1	The procedures for making a Procurement-related Complaint are detailed in the "Procurement Regulations for IPF Borrowers (Annex III)." If a Bidder wishes to make a Procurement-related Complaint, the Bidder should submit its complaint following these procedures, in writing (by the quickest means available, that is either by email or fax), to: **MEMBER (REFORMS & MODERNIZATION)** **CHAIRPERSON** **GRIEVANCE REDRESSAL COMMITTEE** **FEDERAL BOARD OF REVENUE** Room No. 350, 3rd Floor, Federal Board of Revenue, FBR House, Constitutional Avenue, Sector G - 5/2, **Postal Code: 44000** Islamabad, Pakistan Email: memberr&m@fbr.gov.pk

	In summary, a Procurement-related Complaint may challenge any of the following: **1.** the terms of the Bidding Documents; **2.** the Purchaser's decision to exclude a Bidder from the procurement process prior to the award of contract; and **3.** the Purchaser's decision to award the contract.

Section III - Evaluation and Qualification Criteria

This Section contains the criteria that the Purchaser shall use to evaluate Bids and qualify the Bidders. No other factors, methods or criteria shall be used other than specified in this bidding document.

TECHNICAL PART

1. Qualification

Qualification Criteria (ITB 32.1)

The Purchaser shall assess each Bid against the following Qualification Criteria. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications.

(a) **Financial Capability**: The Bidder shall submit audited Financial Statements, if not required by the law of the Bidder's country, other financial statements acceptable to the Purchaser, of the last **five (05)** years (2018, 2019, 2020, 2021, 2022) demonstrating the financial capacity of the bidder sufficient to complete the contract satisfactorily. These financial statements must include balance sheets, profit and loss accounts, assets and liabilities, investments and availability of financial resources to manage the contract. **For a joint venture, this requirement shall be met by each member**.

(b) **Specific Experience**: The Bidder shall demonstrate that it has successfully completed at least two *contracts* within the last five years prior to bid submission deadline, each with a value of at least $ 2 million[1] equivalent in PKR; with a minimum of 10 racks per contract of Data Center that have been successfully and substantially completed and that are similar in nature and complexity to the Goods and Related Services under the Contract. For a joint venture, this requirement may be met by all members combined.

(c) **Documentary Evidence:** The Bidder shall furnish documentary evidence to demonstrate that the Goods it offers meet the following usage requirement:

i. Confirmation that Data Centre is TIA-942B Rated-III/IV or equivalent design.
ii. The bidder shall furnish documentary evidence in support of its qualitative manufacturing processes and products confirming an acceptable international standard like ISO, CE, BIS, USFDA WHO, ICRP, ANSI etc., as required in Technical Specifications of Section VII viz., Schedule of Requirements.
iii. The offered brand and its model have been in operation for a minimum of **three (03)** years.

(d) **Manufacturing experience and Technical Capacity**: For the items under the Contract that the bidder is a manufacturer, the Bidder shall furnish documentary evidence to demonstrate that:

(i) it has manufactured goods of similar nature and complexity for at least 10 years, prior to the bid submission deadline; and

[1] PKR to be converted to USD at the rate when contract was executed

(ii) its annual production capacity of goods of similar nature and complexity for each of the last Five years prior to the bid submission deadline, is at least2 times the quantities specified under the contract.

(e) Relevant specific experience to demonstrate cyber security experience, practice and track record, including relevant Cyber security accreditation such as ISO 27000 (ISO 27001) or equivalent.

(f) **Manufacturer's authorization**: A Bidder who does not manufacture an item/s where a manufacturer authorization is required in accordance with BDS ITB 17.2 (a), the Bidder shall provide evidence of being duly authorized by a manufacturer (Manufacturer's Authorization Form, Section IV, Bidding Forms), meeting the criteria in (d) (i) and (ii) above, to supply the Goods;

(g) A bidder who does who does not manufacture an item/s where a manufacturer authorization is not required in accordance with BDS ITB 17.2 (a), the bidder shall submit documentation on, its status as a supplier, to the satisfaction of the Purchaser through a currently valid Authorization Certificate. Authorized Agent must have Tier-1/ highest level partnership

At the time of Contract Award, the Bidder (including each subcontractor proposed by the Bidder) shall not be subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.

2. Technical Evaluation (ITB 32.4)

Assessment of adequacy of Technical Part with the requirements, shall be made as follows, in accordance with BDS ITB 32.4:

S. No.	Requirement	Max. Score	Criteria	Documentary Proof
1	Bidder delivered OEM/ Manufacturer Datacenter solutions in last 10 years	10	Total Number of Projects (Pakistan) of Bid in consideration/ Maximum No. of project (Pakistan) amongst all the Bid.	Documents are required to demonstrate.
2	Product (Data center min of 10 IT racks) delivered by principal/OEM (Last ten (10) years)	10	Total Number of Projects (Pakistan) of Bid in consideration/ Maximum total Number of projects amongst all Bids	Documentary evidences are required.
3	OEM local presence for support and parts availability.	10	Two (02) parts exchange center /warehouse by OEM in Lahore & Islamabad	Documentary evidences are required.
4	Relationship with OEM	10	5 years of partnership with the OEM	Partnership Certificate from OEM

5	Product Compatibility	30	Solution major components (UPS, Power Distribution units, Rack & Rack PDU, EMS, Precision cooling, DCIM & Row containment) must be compatible.	Documentary evidences are required.
6	Rated/Tier-III Compliance design (Both sites)	10	Compliance details for attaining Rated-3/Tier-III Certificate including High-Level & Low-Level Design.	The relevant document required to demonstrate design details.
7	Staff competence and relevance to the work	20	ATD / CDCS/ CDCE CDCP/ CDFOS OEM certified resource PMP Certified	Resume of team members must be provided

FINANCIAL PART

1. Margin of Preference (ITB 37): Not Applicable

If the Bidding Data Sheet so specifies, the Purchaser will grant a margin of preference to goods manufactured in the Purchaser's country for the purpose of Bid comparison, in accordance with the procedures outlined in subsequent paragraphs.

Substantially responsive Bids will be classified in one of three groups, as follows*:*

(a) **Group A:** Bids offering goods manufactured in the Purchaser's Country, for which (i) labor, raw materials, and components from within the Purchaser's Country account for more than thirty (30) percent of the EXW price; and (ii) the production facility in which they will be manufactured or assembled has been engaged in manufacturing or assembling such goods at least since the date of Bid submission.

(b) **Group B:** All other Bids offering Goods manufactured in the Purchaser's Country.

(c) **Group C:** Bids offering Goods manufactured outside the Purchaser's Country that have been already imported or that will be imported.

To facilitate this classification by the Purchaser, the Bidder shall complete whichever version of the Price Schedule furnished in the bidding document is appropriate provided, however, that the completion of an incorrect version of the Price Schedule by the Bidder shall not result in rejection of its Bid, but merely in the Purchaser's reclassification of the Bid into its appropriate Bid group.

The Purchaser will first review the Bids to confirm the appropriateness of, and to modify as necessary, the Bid group classification to which Bidders assigned their Bids in preparing their Bid Forms and Price Schedules.

Following the combined evaluation procedure described below, the Bids in each group will then be compared to determine the Most Advantageous Bid in that group. The Most Advantageous

Bid from each group shall then be compared with each other and if as a result of this comparison a Bid from Group A or Group B is the Most Advantageous, it shall be selected for the award.

If as a result of the preceding comparison, a Bid from Group C is the Most Advantageous Bid, all Bids from Group C shall be further compared with the Bid with the lowest evaluated cost from Group A after adding to the evaluated price of goods offered in each Bid from Group C, for the purpose of this further comparison only, an amount equal to 15% (fifteen percent) of the respective CIP Bid price for goods to be imported and already imported goods. Both prices shall include unconditional discounts and be corrected for arithmetical errors. If the Bid from Group A is the Most Advantageous, it shall be selected for award. If not, the Most Advantageous Bid from Group C shall be selected.

2. Evaluation Criteria (ITB 34.6): Not Applicable

The Purchaser shall use the criteria and methodologies listed in this Section to evaluate the Financial Part.

The Purchaser's evaluation of the Financial Part may take into account, in addition to the Bid Price, one or more of the following factors as **specified in BDS ITB 34.6,** using the following criteria and methodologies.

(a) Delivery schedule. (As per Incoterms specified in the BDS)

The Goods specified in the List of Goods are required to be delivered within the acceptable time range (after the earliest and before the final date, both dates inclusive) specified in Section VII, Schedule of Requirements. No credit will be given to deliveries before the earliest date, and Bids offering delivery after the final date shall be treated as nonresponsive. Within this acceptable period, an adjustment of [insert the adjustment factor] will be added, for evaluation purposes only, to the Bid price of Bids offering deliveries later than the "Earliest Delivery Date" specified in Section VII, Schedule of Requirements.

(b) Deviation in payment schedule. *[insert one of the following]*

(i) *Bidders shall state their Bid price for the payment schedule outlined in the SCC. Bids shall be evaluated on the basis of this base price. Bidders are, however, permitted to state an alternative payment schedule and indicate the reduction in Bid price they wish to offer for such alternative payment schedule. The Purchaser may consider the alternative payment schedule and the reduced Bid price offered by the Bidder selected on the basis of the base price for the payment schedule outlined in the SCC.*

or

(i) *The SCC stipulates the payment schedule specified by the Purchaser. If a Bid deviates from the schedule and if such deviation is considered acceptable to the Purchaser, the Bid will be evaluated by calculating interest earned for any earlier payments involved in the terms outlined in the Bid as compared with*

those stipulated in the SCC, at the rate per annum of [insert the adjustment rate].

(c) Cost of major replacement components, mandatory spare parts, and service. *[insert one of the following]*

(i) *The list of items and quantities of major assemblies, components, and selected spare parts, likely to be required during the initial period of operation specified in the BDS 16.4, is in the List of Goods. An adjustment equal to the total cost of these items, at the unit prices quoted in each Bid, shall be added to the Bid price, for evaluation purposes only.*

or

(i) *The Purchaser will draw up a list of high-usage and high-value items of components and spare parts, along with estimated quantities of usage in the initial period of operation specified in the BDS 16.4. The total cost of these items and quantities will be computed from spare parts unit prices submitted by the Bidder and added to the Bid price, for evaluation purposes only.*

(d) Availability in the Purchaser's Country of spare parts and after sales services for equipment offered in the Bid.

An adjustment equal to the cost to the Purchaser of establishing the minimum service facilities and parts inventories if quoted separately, shall be added to the Bid price, for evaluation purposes only.

(e) Life Cycle Cost

If specified in BDS 34.6. an adjustment to take into account the additional life cycle costs for the period specified below, such as the operating and maintenance costs of the Goods, will be added to the Bid price, for evaluation purposes only. The adjustment will be evaluated in accordance with the methodology specified below.

[Note to purchase: Life cycle costings should be used when the costs of operation and/or maintenance over the specified life of the goods are estimated to be considerable in comparison with the initial cost and may vary among different Bids. Life cycle cost shall be evaluated on a net present value basis. If life cycle costs apply then specify the factors required to determine them for evaluation purposes.]

[Either amend the following text as required, or delete if life cycle cost is not applicable]

(i) number of years for life cycle cost determination *[insert the number of years*];

(ii) the discount rate to be applied to determine the net present value of future operation and maintenance costs (recurrent costs) is *[insert the discount rate*];

(iii) the annual operating and maintenance costs (recurrent costs) shall be determined on the basis of the following methodology: *[insert methodology*];

(iv) and the following information is required from bidders *[insert any information required from bidders, including prices*].

(f) Performance and productivity of the equipment. *[insert one of the following]*

(i) Performance and productivity of the equipment. An adjustment representing the capitalized cost of additional operating costs over the life of the goods will be added to the Bid price, for evaluation purposes if specified in the BDS 34.6. The adjustment will be evaluated based on the drop in the guaranteed performance or efficiency offered in the Bid below the norm of 100, using the methodology below.

[insert the methodology and criteria if applicable]

or

(i) An adjustment to take into account the productivity of the goods offered in the Bid will be added to the Bid price, for evaluation purposes only, if specified in BDS 34.6. The adjustment will be evaluated based on the cost per unit of the actual productivity of goods offered in the Bid with respect to minimum required values, using the methodology below.

[insert the methodology and criteria if applicable].

(g) Specific additional criteria

[Other specific additional criteria to be considered in the evaluation, and the evaluation method shall be detailed in BDS 34.6]

[[Specify adjustments, if any, to be made for financial part evaluation purposes for any additional quantifiable sustainable *procurement requirements, not covered by other evaluation criteria. Ensure that there is no duplication (double counting) with the point system technical evaluation criteria.].]*

Combined Evaluation

The Purchaser will evaluate and compare the Bids that have been determined to be substantially responsive.

The Purchaser's evaluation of responsive Bids will take into account technical factors, in addition to cost factors.

An Evaluated Bid Score (B) will be calculated for each responsive Bid using the following formula (for comparison in percentages), which permits a comprehensive assessment of the Bid price and the technical merits of each Bid:

$$B \equiv \frac{Clow}{C} * X * 100 + \frac{T}{Thigh} * (1 - X) * 100$$

where

C = Evaluated Bid Price

C_{low} = the lowest of all Evaluated Bid Prices among responsive Bids

T = the total Technical Score awarded to the Bid

T_{high} = the Technical Score achieved by the Bid that was scored best among all responsive Bids

X = weight for the Cost as specified in the BDS

The Bid with the best evaluated Bid Score (B) among responsive Bids shall be the Most Advantageous Bid provided the Bidder is qualified to perform the Contract.

Multiple Contracts (ITB 34.4)

If in accordance with **ITB 1.1**, Bids are invited for more than one lot, the contract will be awarded to the Bidder or Bidders with the Most Advanageous Bid for the individual lots.

However, if a Bidder, with Bids that are substantially responsive and with highest evaluated score for individual lots, is not qualified for the combination of the lots, then the award will be made based on the highest total score for combination of lots for which Bidders are qualified.

Discounts that are conditional on the award of more that one lot will not be considered for bid evaluation purpose.

Alternative Bids (ITB 13.1): Not Applicable

An alternative if permitted under ITB 13.1, will be evaluated as follows:

[insert one of the following]

"A Bidder may submit an Alternative Bid (Technical and Financial Parts) only with a Bid for the base case. The Purchaser shall only consider the Alternative Bids offered by the Bidder whose Bid for the base case was determined to be the Most Advantageous Bid."

or

"A Bidder may submit an Alternative Bid with or without a Bid for the base case. The Purchaser shall consider Bids offered for alternatives as specified in the Technical Specifications of Section VII, Schedule of Requirements. All Bids received, for the base case, as well as Alternative Bids meeting the specified requirements, shall be evaluated on their own merits in accordance with the same procedures, as specified in the ITB 30 and ITB 34."

Section IV - Bidding Forms

Table of Forms

Letter of Bid – Technical Part

INSTRUCTIONS TO BIDDERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE DOCUMENT

Place this Letter of Bid in the first envelope "TECHNICAL PART".

The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and business address.

Note: All italicized text in black font is to help Bidders in preparing this form and Bidders shall delete it from the final document.

Date of this Bid submission: [*insert date (as day, month and year) of Bid submission*]
RFB No.: [*insert number of Bidding process*]
Request for Bid No.: [*insert identification*]
Alternative No.: [*insert identification No if this is a Bid for an alternative*]

To: **[*insert complete name of Purchaser*]**

We, the undersigned Bidder, hereby submit our Bid, in two parts, namely:

(a) the Technical Part, and

(b) the Financial Part.

In submitting our Bid we make the following declarations:

(a) **No reservations:** We have examined and have no reservations to the bidding document, including addenda issued in accordance with Instructions to Bidders (ITB 8);

(b) **Eligibility**: We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;

(c) **Bid/Proposal-Securing Declaration**: We have not been suspended nor declared ineligible by the Purchaser based on execution of a Bid Securing Declaration or Proposal Securing Declaration in the Purchaser's country in accordance with ITB 4.7;

(d) **Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH):** [*select the appropriate option from (i) to (iii) below and delete the others. In case of JV members and/or subSuppliers, indicate the status of disqualification by the Bank of each JV member and/or subSupplier]*.

We, including any of our subSuppliers:

(i) [have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.]

(ii) [are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.]

(iii) [had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, and were removed from the disqualification list. An arbitral award on the disqualification case has been made in our favor.]

(e) **Conformity:** We offer to supply in conformity with the bidding document and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods: [*insert a brief description of the Goods and Related Services*];

(f) **Bid Validity**: Our Bid shall be valid until *[insert day, month and year in accordance with ITB 18.1]*, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(g) **Performance Security**: If our Bid is accepted, we commit to obtain a performance security in accordance with the bidding document;

(h) **One Bid per Bidder**: We are not submitting any other Bid(s) as an individual Bidder, and we are not participating in any other bid(s) as a Joint Venture member or as a subSupplier, and meet the requirements of ITB 4.3, other than Alternative Bids submitted in accordance with ITB 13;

(i) **Suspension and Debarment**: We, along with any of our subSuppliers, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Purchaser's country laws or official regulations or pursuant to a decision of the United Nations Security Council;

(j) **State-owned enterprise or institution**: [*select the appropriate option and delete the other*] [*We are not a state-owned enterprise or institution*] / [*We are a state-owned enterprise or institution but meet the requirements of ITB 4.6*];

(k) **Binding Contract**: We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;

(l) **Not Bound to Accept**: We understand that you are not bound to accept the lowest evaluated cost Bid, the Most Advantageous Bid or any other Bid that you may receive; and

(m) **Fraud and Corruption**: We hereby certify that we have taken steps to ensure that no person acting for us, or on our behalf, engages in any type of Fraud and Corruption.

Name of the Bidder: *[*insert complete name of Bidder*]

Name of the person duly authorized to sign the Bid on behalf of the Bidder: ** [*insert complete name of person duly authorized to sign the Bid*]

Title of the person signing the Bid: [*insert complete title of the person signing the Bid*]

Signature of the person named above: [*insert signature of person whose name and capacity are shown above*]

Date signed [*insert date of signing*] **day of** [*insert month*], [*insert year*]

*****: In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder.
**: Person signing the Bid shall have the power of attorney given by the Bidder. The power of attorney shall be attached with the Bid Schedules.

Technical Part

The technical bid shall include all relevant information required to evaluate the technical Part in accordance with the requirements.

To establish the conformity of the Goods and Related Services to the RFB document, the Bidder shall furnish the documentary evidence that the Goods conform to the technical specifications and standards, including any essential technical and performance characteristics specified in Section VII, Schedule of Requirements. Any required functional guarantees shall also be provided. The attached forms/format may support the Bidder to organize information required to present its technical bid.

The documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed item by item description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to the technical specification, and if applicable, a statement of deviations and exceptions to the provisions of the Section VII, Schedule of Requirements.

In the interest of timely bid evaluation and contract award, Bidders are encouraged not to overload the supporting materials with documents that do not directly address the Purchaser's requirements.

The Bidder shall also furnish a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods during the period specified in the BDS following commencement of the use of the goods by the Purchaser.

Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by the Purchaser in the Schedule of Requirements, are intended to be descriptive only and not restrictive. The Bidder may offer other standards of quality, brand names, and/or catalogue numbers, provided that it demonstrates, to the Purchaser's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified in the Section VII, Schedule of Requirements.

If the contract has been assessed to present potential or actual cyber security risks, the technical bid must include proposed cyber security risks management plan.

If there are assessed supply chain risks, the technical bid must include proposed supply chain risk management plan.

The Manufacture's Authorizations shall be included in accordance with ITB BDS 17.2 (a) and the attached Manufacturer's Authorization form.

Technical Bid Checklist

Technical. Requirement No. _	Technical Requirement: *[insert: description of requirement]*
Bidder's technical bid/ compliance:	
Bidder's cross references to supporting information in the Technical Bid:	

Functional Guarantees

(to be used as applicable)

The Bidder shall copy in the left column of the table below; the identification of each functional guarantee required in the Specification and in the right column, provides the corresponding value for each functional guarantee of the proposed Goods.

Required Functional Guarantee	Value of Functional Guarantee of the Goods
1.	
2.	
3.	
…	

Manufacturer's Authorization

[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its Bid, if so indicated in the ***BDS.****]*

Date: *[insert date (as day, month and year) of Bid submission]*

RFB No.: *[insert number of RFB process]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[insert complete name of Purchaser]*

WHEREAS

We *[insert complete name of Manufacturer]*, who are official manufacturers of *[insert type of goods manufactured]*, having factories at [insert full address of Manufacturer's factories], do hereby authorize *[insert complete name of Bidder]* to submit a Bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

We confirm that we do not engage or employ forced labor or persons subject to trafficking or child labor, in accordance with Clause 14 of the General Conditions of Contract.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*

Title: *[insert title]*

Dated on _____ day of _____, _____ *[insert date of signing]*

Bidder Information Form

[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: *[insert date (as day, month and year) of Bid submission*]
RFB No.: *[insert number of Bidding process]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

Page _____ of_ _____ pages

1. Bidder's Name *[insert Bidder's legal name]*
2. In case of JV, legal name of each member : *[insert legal name of each member in JV]*
3. Bidder's actual or intended country of registration: *[insert actual or intended country of registration]*
4. Bidder's year of registration: *[insert Bidder's year of registration]*
5. Bidder's Address in country of registration: *[insert Bidder's legal address in country of registration]*
6. Bidder's Authorized Representative Information Name: *[insert Authorized Representative's name]* Address: *[insert Authorized Representative's Address]* Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]* Email Address: *[insert Authorized Representative's email address]*
7. Attached are copies of original documents of *[check the box(es) of the attached original documents]* ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.4. ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. ☐ In case of state-owned enterprise or institution, in accordance with ITB 4.6 documents establishing: • Legal and financial autonomy • Operation under commercial law • Establishing that the Bidder is not under the supervision of the Purchaser

8. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. The successful Bidder shall provide additional information on beneficial ownership, using the Beneficial Ownership Disclosure Form.

Bidder's JV Members Information Form

[The Bidder shall fill in this Form in accordance with the instructions indicated below. The following table shall be filled in for the Bidder and for each member of a Joint Venture]].

Date: *[insert date (as day, month and year) of Bid submission*]
RFB No.: *[insert number of RFB process]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

Page _____ of_ _____ pages

1. Bidder's Name: *[insert Bidder's legal name]*
2. Bidder's JV Member's name: *[insert JV's Member legal name]*
3. Bidder's JV Member's country of registration: *[insert JV's Member country of registration]*
4. Bidder's JV Member's year of registration: *[insert JV's Member year of registration]*
5. Bidder's JV Member's legal address in country of registration: *[insert JV's Member legal address in country of registration]*
6. Bidder's JV Member's authorized representative information Name: *[insert name of JV's Member authorized representative]* Address: *[insert address of JV's Member authorized representative]* Telephone/Fax numbers: *[insert telephone/fax numbers of JV's Member authorized representative]* Email Address: *[insert email address of JV's Member authorized representative]*
7. Attached are copies of original documents of *[check the box(es) of the attached original documents]* ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.4. ☐ In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Purchaser, in accordance with ITB 4.6. 8. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. The successful Bidder shall provide additional information on beneficial ownership for each JV member using the Beneficial Ownership Disclosure Form.

Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment Performance Declaration

[The following table shall be filled in by the Bidder, each member of a Joint Venture and each subcontractor proposed by the Bidder]

Bidder's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member's or Subcontractor's Name: *[insert full name]*
RFB No. and title: *[insert RFB number and title]*
Page *[insert page number]* of *[insert total number]* pages

SEA and/or SH Declaration **in accordance with Section III, Qualification Criteria, and Requirements**
We: ☐ (a) have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations ☐ (b) are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations ☐ (c) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, and were removed from the disqualification list. An arbitral award on the disqualification case has been made in our favor.
[*If (c) above is applicable, attach evidence of an arbitral award reversing the findings on the issues underlying the disqualification.]*

Form of Bid Security

(Bank Guarantee)

[The bank shall fill in this Bank Guarantee Form in accordance with the instructions indicated.]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Purchaser to insert its name and address]*

RFB No.: *[Purchaser to insert reference number for the Request for Bids]*

Alternative No.*: [Insert identification No if this is a Bid for an alternative]*

Date: *[Insert date of issue]*

BID GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ *[insert name of the Bidder, which in the case of a joint venture shall be the name of the joint venture (whether legally constituted or prospective) or the names of all members thereof]* (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its Bid (hereinafter called "the Bid") for the execution of _____ under Request for Bids No. _____ _ ("the RFB").

Furthermore, we understand that, according to the Beneficiary's conditions, Bids must be supported by a Bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

(a) has withdrawn its Bid prior to the Bid validity expiry date set forth in the Applicant's Letter of Bid, or any extended date provided by the Applicant; or

(b) having been notified of the acceptance of its Bid by the Beneficiary prior to the expiry date of the Bid validity or any extension thereof provided by the Applicant has failed to: (i) sign the contract agreement, or (ii) furnish the performance security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Applicant is the successful Bidder, upon our receipt of copies of the Contract agreement signed by the Applicant and the performance security issued to the Beneficiary in relation to such Contract agreement; or (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Bidding process; or (ii) twenty-eight days after the expiry date of the Bid validity.

Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

_____

[Signature(s)]

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

Form of Bid Security (Bid Bond)

[The Surety shall fill in this Bid Bond Form in accordance with the instructions indicated.]

BOND NO. _____

BY THIS BOND *[name of Bidder]* as Principal (hereinafter called "the Principal"), and *[name, legal title, and address of surety]*, **authorized to transact business in** *[name of country of Purchaser]*, as Surety (hereinafter called "the Surety"), are held and firmly bound unto *[name of Purchaser]* as Obligee (hereinafter called "the Purchaser") in the sum of *[amount of Bond]*[2] *[amount in words]*, for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted or will submit a written Bid to the Purchaser dated the ___ day of _____, 20__, for the supply of *[name of Contract]* (hereinafter called the "Bid").

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

(a) withdraws its Bid prior to the Bid validity expiry date set forth in the Principal's Letter of Bid, or any extended date provided by the Principal; or

(b) having been notified of the acceptance of its Bid by the Purchaser prior to the expiry date of the Bid validity or any extension thereto provided by the Applicant has failed to: (i) execute the Contract agreement; or (ii) furnish the Performance Security, in accordance with the Instructions to Bidders ("ITB") of the Purchaser's bidding document.

then the Surety undertakes to immediately pay to the Purchaser up to the above amount upon receipt of the Purchaser's first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 28 days after the date of expiry of the Bid validity set forth in the Principal's Letter of Bid or any extension thereto provided by the Principal.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this ____ day of _____ 20__.

---

[2] The amount of the Bond shall be denominated in the currency of the Purchaser's country or the equivalent amount in a freely convertible currency.

Principal: _____ Surety: _____

Apply Corporate Seal (where appropriate)

_____	_____
(Signature)	*(Signature)*
(Printed name and title)	*(Printed name and title)*

Form of Bid-Securing Declaration

[The Bidder shall fill in this Form in accordance with the instructions indicated.]

Date: *[date (as day, month and year)]*
RFB No.: *[number of RFB process]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[complete name of Purchaser]*

We, the undersigned, declare that:

We understand that, according to your conditions, Bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for Bidding or submitting proposals in any contract with the Purchaser for the period of time specified in Section II – Bid Data Sheet if we are in breach of our obligation(s) under the Bid conditions, because we:

(a) have withdrawn our Bid prior to the expiry date of the Bid validity specified in the Letter of Bid or any extended date provided by us; or

(b) having been notified of the acceptance of our Bid by the Purchaser prior to the expiry date of the Bid validity in the Letter of Bid or any extended date provided by us, (i) fail or refuse to sign the Contract; or (ii) fail or refuse to furnish the Performance Security, if required, in accordance with the ITB.

We understand this Bid Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiry date of the Bid validity.

Name of the Bidder*****_____

Name of the person duly authorized to sign the Bid on behalf of the Bidder******_____

Title of the person signing the Bid_____

Signature of the person named above_____

Date signed _____ day of _____, _____

*****: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

**: Person signing the Bid shall have the power of attorney given by the Bidder attached to the Bid
[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the Bid.]

Letter of Bid - Financial Part

INSTRUCTIONS TO BIDDERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE DOCUMENT

Place this Letter of Bid - Financial Part in the second envelope marked "FINANCIAL PART".

The Bidder must prepare the Letter of Bid - Financial Part on stationery with its letterhead clearly showing the Bidder's complete name and business address.

Note: All italicized text is to help Bidders in preparing this form.

Date of this Bid submission: [*insert date (as day, month and year) of Bid submission*]
RFB No.: [*insert number of bidding process*]
Request for Bid No.: [*insert identification*]
Alternative No.: [*insert identification No if this is a Bid for an alternative*]

To: [*insert complete name of Purchaser*]

We, the undersigned Bidder, hereby submit the second part of our Bid, the Financial Part

In submitting our Financial Part we make the following additional declarations:

(a) **Bid Validity**: Our Bid shall be valid until *[insert day, month and year in accordance with ITB 18.1]*, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(b) **Total Price:** The total price of our Bid, excluding any discounts offered in item (c) below is:

In case of only one lot, the total price of the Bid is [*insert the total price of the bid in words and figures, indicating the various amounts and the respective currencies*];

In case of multiple lots, the total price of each lot is [*insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies*];

In case of multiple lots, total price of all lots (sum of all lots) [*insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies*];

(c) **Discounts:** The discounts offered and the methodology for their application are:

(i) The discounts offered are: [*Specify in detail each discount offered*]

(ii) The exact method of calculations to determine the net price after application of discounts is shown below: [*Specify in detail the method that shall be used to apply the discounts*];

(d) **Commissions, gratuities and fees:** We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: [*insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity*].

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate "none.")

(e) **Binding Contract:** We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed.

Name of the Bidder:*[*insert complete name of the Bidder*]

Name of the person duly authorized to sign the Bid on behalf of the Bidder: ** [*insert complete name of person duly authorized to sign the Bid*]

Title of the person signing the Bid: [*insert complete title of the person signing the Bid*]

Signature of the person named above: [*insert signature of person whose name and capacity are shown above*]

Date signed [*insert date of signing*] **day of** [*insert month*], [*insert year*]

*****: In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder.

**: Person signing the Bid shall have the power of attorney given by the Bidder. The power of attorney shall be attached with the Bid Schedules.

Price Schedule Forms

*[The Bidder shall fill in these Price Schedule Forms in accordance with the instructions indicated. The list of line items in column 1 of the **Price Schedules** shall coincide with the List of Goods and Related Services specified by the Purchaser in the Schedule of Requirements.]*

Price Schedule: Goods Manufactured Outside the Purchaser's Country, already imported*

(Group C Bids, Goods already imported)

Currencies in accordance with ITB 15

Date:_____
RFB No: _____
Alternative No: _____
Page N° _____ of _____

1	2	3	4	5	6	7	8	9	10	11	12
Line Item N°	Description of Goods	Country of Origin	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price including Custom Duties and Import Taxes paid, in accordance with ITB 14.8(c)(i)	Custom Duties and Import Taxes paid per unit in accordance with ITB 14.8(c)(ii) , [to be supported by documents]	Unit Price net of custom duties and import taxes, in accordance with ITB 14.8 (c) (iii) (Col. 6 minus Col.7)	Price per line item net of Custom Duties and Import Taxes paid, in accordance with ITB 14.8(c)(i) (Col. 5×8)	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the goods to their final destination, as specified in BDS in accordance with ITB 14.8 (c)(v)	Sales and other taxes paid or payable per item if Contract is awarded (in accordance with ITB 14.8(c)(iv)	Total Price per line item (Col. 9+10)
[insert number of the item]	*[insert name of Goods]*	*[insert country of origin of the Good]*	*[insert quoted Delivery Date]*	*[insert number of units to be supplied and name of the physical unit]*	*[insert unit price per unit]*	*[insert custom duties and taxes paid per unit]*	*[insert unit price net of custom duties and import taxes]*	*[insert price per line item net of custom duties and import taxes]*	*[insert price per line item for inland transportation and other services required in the Purchaser's Country]*	*[insert sales and other taxes payable per item if Contract is awarded]*	*[insert total price per line item]*
										Total Bid Price	

Name of Bidder *[insert complete name of Bidder]* Signature of Bidder *[signature of person signing the Bid]* Date *[insert date]*

* *[For previously imported Goods, the quoted price shall be distinguishable from the original import value of these Goods declared to customs and shall include any rebate or mark-up of the local agent or representative and all local costs except import duties and taxes, which have been and/or have to be paid by the Purchaser. For clarity the Bidders are asked to quote the price including import duties, and additionally to provide the import duties and the price net of import duties which is the difference of those values.]*

Price Schedule: Goods Manufactured in the Purchaser's Country

Purchaser's Country _____	(Group A and B Bids) Currencies in accordance with ITB 15	Date:_____ RFB No: _____ Alternative No: _____ Page N° _____ of _____

1	2	3	4	5	6	7	8	9	10
Line Item N°	Description of Goods	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price EXW	Total EXW price per line item (Col. 4×5)	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the Goods to their final destination	Cost of local labor, raw materials and components from with origin in the Purchaser's Country % of Col. 5	Sales and other taxes payable per line item if Contract is awarded (in accordance with ITB 14.8(a)(ii)	Total Price per line item (Col. 6+7)
[insert number of the item]	*[insert name of Good]*	*[insert quoted Delivery Date]*	*[insert number of units to be supplied and name of the physical unit]*	*[insert EXW unit price]*	*[insert total EXW price per line item]*	*[insert the corresponding price per line item]*	*[Insert cost of local labor, raw material and components from within the Purchase's country as a % of the EXW price per line item]*	*[insert sales and other taxes payable per line item if Contract is awarded]*	*[insert total price per item]*
								Total Price	

Name of Bidder *[insert complete name of Bidder]* Signature of Bidder *[signature of person signing the Bid]* Date *[insert date]*

Price and Completion Schedule - Related Services

			Currencies in accordance with ITB 15		Date:_____ RFB No: _____ Alternative No: _____ Page N° _____ of _____	
1	2	3	4	5	6	7
Service N°	Description of Services (excludes inland transportation and other services required in the Purchaser's Country to convey the goods to their final destination)	Country of Origin	Delivery Date at place of Final destination	Quantity and physical unit	Unit price	Total Price per Service (Col. 5*6 or estimate)
[insert number of the Service]	*[insert name of Services]*	*[insert country of origin of the Services]*	*[insert delivery date at place of final destination per Service]*	*[insert number of units to be supplied and name of the physical unit]*	*[insert unit price per item]*	*[insert total price per item]*
				Total Bid Price		

Name of Bidder *[insert complete name of Bidder]* Signature of Bidder *[signature of person signing the Bid]* Date *[insert date]*

Section V - Eligible Countries

Eligibility for the Provision of Goods, Works and Non Consulting Services in Bank-Financed Procurement

In reference to ITB 4.8 and ITB 5.1, for the information of the Bidders, at the present time firms, goods and services from **the countries that does not have trade relationships with Pakistan** are excluded from this Bidding process:

Section VI - Fraud and Corruption

(Section VI shall not be modified)

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, the Bank:

a. Defines, for the purposes of this provision, the terms set forth below as follows:

i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;

iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

v. "obstructive practice" is:

(a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.

b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

d. Pursuant to the Bank's Anti-Corruption Guidelines, and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;[1] (ii) to be a nominated[2] sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;

e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents, personnel, permit the Bank to inspect[3] all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

---

[1] For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.

[2] A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

[3] Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

PART 2 – Supply Requirements

Section VII - Schedule of Requirements

Contents

Notes for Preparing the Schedule of Requirements

The Schedule of Requirements shall be included in the bidding document by the Purchaser, and shall cover, at a minimum, a description of the goods and services to be supplied and the delivery schedule.

The objective of the Schedule of Requirements is to provide sufficient information to enable Bidders to prepare their Bids efficiently and accurately, in particular, the Price Schedule, for which a form is provided in Section IV. In addition, the Schedule of Requirements, together with the Price Schedule, should serve as a basis in the event of quantity variation at the time of award of contract pursuant to ITB 45.1.

The date or period for delivery should be carefully specified, taking into account (a) the implications of delivery terms stipulated in the Instructions to Bidders pursuant to the *Incoterms* rules (i.e., EXW, or CIP, FOB, FCA terms—that "delivery" takes place when goods are delivered **to the carriers**), and (b) the date prescribed herein from which the Bidder's delivery obligations start (i.e., notice of award, contract signature, opening or confirmation of the letter of credit).

1. List of Goods and Delivery Schedule

[The Purchaser shall fill in this table, with the exception of the column "Bidder's offered Delivery date" to be filled by the Bidder]

Line Item N°	**Description of Goods**	**Quantity**	**Physical unit**	**Final (Project Site) Destination as specified in BDS**	**Delivery (as per Incoterms) Date**		
					Earliest Delivery Date	**Latest Delivery Date**	**Bidder's offered Delivery date [*to be provided by the Bidder*]**
[insert item No]	*[insert description of Goods]*	*[insert quantity of item to be supplied]*	*[insert physical unit for the quantity]*	*[insert place of Delivery]*	*[insert the number of days following the date of effectiveness of the Contract]*	*[insert the number of days following the date of effectiveness of the Contract]*	*[insert the number of days following the date of effectiveness of the Contract]*
	As per BOQ			Islamabad & Lahore			

2. List of Related Services and Completion Schedule

[This table shall be filled in by the Purchaser. The Required Completion Dates should be realistic, and consistent with the required Goods Delivery Dates (as per Incoterms)]

Service	Description of Service	Quantity[1]	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
[insert Service No]	***[insert description of Related Services]***	***[insert quantity of items to be supplied]***	***[insert physical unit for the items]***	***[insert name of the Place]***	***[insert required Completion Date(s)]***
	As Per BOQ			*Islamabad & Lahore, Pakistan*	

1. If applicable

3. Technical Specifications

1. Project Background

To ensure reliable and secure IT services, PURCHASER intends to build a new Rated/Tier III compliant Data Center for 40 racks, in an air-contained system in Islamabad and 20 racks DR in Lahore.

Prime Bidder must Design the Data Center Physical Infrastructure comprising of civil, electrical and mechanical works. This shall also include site preparation to make it suitable for setting up a Rated/Tier III Data Centre.

The general requirement for the Data Centre is mentioned hereafter and system-wise requirements/scope of work/specification are as per the details below. The member-in-charge must adhere to the design criteria and specifications.

2. General Scope of work

The member-in-charge, who is the chosen bidder, will be responsible for constructing, operating, and managing the Data Center (DC) for a duration of five (5) years following the successful completion of the Final Acceptance Test (FAT). The specific tasks and responsibilities required of the member-in-charge for establishing, operating, and sustaining the DC are outlined as follows:

Design, Supply, Installation, integration, testing and Commissioning Phase

The overall Scope of Supplier's Work includes following deliverables on turnkey basis:

- All Civil, Mechanical, plumbing & Interior work
- Electrical work including distribution panels, Power Cabling and Distribution
- Grounding as per the proposed/approved solution.
- Uninterrupted power systems
- Integration with existing DG Sets
- Energy Efficient Lighting
- Precision Air conditioning
- Comfort Air conditioning
- Intelligent Smoke & Fire Detection system
- Fire Suppression System
- Access Control System
- Video surveillance system.
- Automatic water Leak Detection system
- Rodent Repellent System
- Structured cabling
- Furniture, Fixtures and appliances
- Integration of complete facility with DCIM
- Successful testing and demonstrations of Data Center as per TIA 942 Standard
- Project Management and Documentation Services
- Any other items required for this purpose.

Operation and Maintenance phase

- Maintain the complete systems/Data Center facility (including Furniture/Civil work) with a defined SLA (Service Level Agreement) for 5 Five years.

- Bidder will also arrange multiple training programs consist on operation and maintenance skills of installed equipment.

The bidder shall carefully go through BOQs, Specifications, drawing/layouts, site conditions to determine complete requirement and to propose complete integrated solution. The bidder should also perform comprehensive site survey to get familiarized with site conditions and propose solution accordingly.

Trainings & Product inspection

- Pre shipment inspection and training of critical physical infrastructure (Cooling, UPS, PDU, DCIM etc.) at factory and international training center. (Total 2 persons)
- Pre shipment inspection of Diesel Generators at the manufacturing facility. (Total 2 person)
- Local training + certification for CDCP for 3 Persons
- Local training + certification for CDFOS for 3 persons
- Local training + certification for CDFOM for 2 persons

3. Electrical Connection:

1. Electrical load sanction from IESCO and LESCO
2. Incoming Main Electrical Transformers/Protection/metering panels
3. One time payment of transformers

4. Project Completion

The project must be completed within 9 Months from award of the Purchase Order. The bidder will provide detailed project implementation plan (PIP) which should not exceed 09 months.

5. Schedule of Submission of Bid

General

Administrative and procedural requirements for the preparation to submit required in the performance of Work, including construction schedules, daily/monthly construction progress reports, shop drawings, product data and material samples.
Construction Schedule

Prepare a fully developed, horizontal bar chart type Supplier's construction schedule. Submit schedule within 10 days of the date established for commencement of Work. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Supplier's Construction Schedule shall be subject to approval of PURCHASER.

Upon the request of PURCHASER, Supplier shall submit a Critical Path Method (CPM) schedule for FBR review and approval.
Procurement Schedule

Prepare a fully developed horizontal bar chart type material arrival schedule. The procurement schedule shall identify the material's submission, ordering and arrival dates. Coordinate the procurement schedule with construction activities.

6. Progress Report

Weekly Construction Reports: Supplier shall prepare Weekly Construction Reports utilizing the form approved by PURCHASER. The Construction Report shall include; date, duration of working hours, count of personnel at the site (skilled or unskilled, labor, surveyor, Engineer etc.), work performed, deliveries of material and equipment; special events, visitors, and inspections. Construction Report shall be submitted to PURCHASER.

Monthly Work Progress Reports: At the end of each month or at such periods of time as may be requested by PURCHASER, the Supplier shall submit a detailed Monthly Work Progress Report utilizing the format approved by PURCHASER. Monthly Work Progress Reports shall be prepared in English and shall include a minimum of 25 photographs. Monthly Work Progress Report shall be submitted to PURCHASER as one original and 4 copies.

7. Shop Drawings

The Bidder is required to present Shop Drawings, which will be freshly prepared and submitted for approval by the PURCHASER. These drawings must be accurately scaled and created using the most up-to-date version of AutoCAD in DWG format.

Shop Drawings should clearly highlight any variations from the Contract Documents by using methods such as highlighting, clouding, or distinctive markings. It's important to note that the Supplier should not duplicate or employ standard information from the Contract Documents as the basis for their Shop Drawings. Any standard information that is not explicitly tailored to the Project's requirements will not be accepted as Shop Drawings.

The finalized Shop Drawings must be submitted to the PURCHASER for review and approval.

Shop Drawings shall include fabrication and installation drawings, setting-out diagrams, equipment or material schedules, patterns, templates and similar drawings.

Shop Drawings shall include, but not limited to the following information:

- Dimensions
- SLD’s (Single Line Drawings)
- Piping, CCTV, Fire & other data center drawings
- Identification of products and materials included
- Compliance with specified standards
- Notation of coordination requirements
- Materials and finishes

Sheet Size: Except for templates, patterns and similar A1 size drawings, shop drawings shall be submitted on A1 size drawings or other sheet sizes as required by PURCHASER.

Initial Submission: Submit 2 copies for PURCHASER's review, the corrected one will be returned to the Supplier.

Final Submission: Submit 3 copies for PURCHASER approval; submit 4 prints where required for maintenance manuals. Two prints will be retained; the remainder will be returned. Do not use shop drawings without an appropriate final stamp indicating action taken in connection with construction.

Coordination Drawings: Supplier shall submit Coordination Drawings as required to eliminate potential conflicts in use of space. Coordination Drawings shall indicate the relationship and integration of different construction elements and/or pieces of equipment that require careful coordination during fabrication or installation to fit in the space provided.

8. Product Brochures/Data

Provide Product Data into a single submission for each element of system. Product data shall include printed information such as manufacturer's installation instructions, catalogue, standard color charts, templates, standard wiring diagrams, operation and maintenance manuals.

Provide information regarding the product's end-of-life and end-of-service aspects, especially when conventional printed data is inadequate for this purpose

SAMPLES: Supplier shall submit material samples (for civil, plumbing work and cabling related tasks), as specified or as otherwise directed by PURCHASER for the review of kind, color, pattern and texture; for a

final check of these characteristics and there compatibility with other elements; and for a comparison of these characteristics between the final submission and the actual component as delivered and installed.

Full-size, fully fabricated samples shaped and finished as specified and physically identical with the material or product proposed, shall be submitted to PURCHASER. Samples shall include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

9. AS-Built Drawings

Before the work is accepted and while the work is in progress, the Supplier is required to provide As-Built Drawings for review and approval by the PURCHASER. These drawings must be created using the most current version of AutoCAD in DWG format.

Once approved, the As-Built Drawings should be submitted in two formats: two sets of printed copies in A1 size and two sets of electronic copies, all appropriately labeled. These As-Built Drawings must be signed, dated, and numbered correctly

10. Photographic Record

Photographs capturing the ongoing progress of the construction shall be periodically taken. These images should provide a comprehensive view of the work's overall scope. The selection of specific viewpoints and the agreed-upon frequency of monthly photographs from the same viewpoint will be determined in collaboration with the PURCHASER.

The photographs must be submitted to the PURCHASER on the first day of each month. Each photograph should have a clear title at the bottom, ensuring that no critical details are obscured. The title should include essential information such as the project name, the Supplier's name, the direction of the view, and the date the photograph was taken

11. Submission Procedure

Make submissions to PURCHASER generally as required by the Contract Documents. Scope of submission to Purchaser includes but is not limited to:

- SubSupplier List.
- Material and Assembly Submission (as required under the sections of the specification) including Samples
- Manufacturer's Literature
- Shop Drawings and Coordination Drawings
- As Built Drawings and Operations & Maintenance Instructions
- Manufacturing Details/Samples
- Calculations, specifications and the like relating to submission, if required by PURCHASER
- Details of temporary works, if required by PURCHASER
- Shipping Documents and Country of Origin
- Manufacturer backed original Warranties and Guarantees
- Project Control Schedules
- Project Close-out Report.

12. Safety and Security Procedures

Provide a project safety and security plan for approval by PURCHASER to include, but not be limited to, the following:

- Health, Safety and Environmental (HSE) Policy
- Protect work, stored products and construction equipment from theft and vandalism.
- Protect premises from entry by unauthorized persons.
- Provide fencing, including gates and locks.

- Protect Engineer operations at site from theft, vandalism or damage resulting from the Supplier's work and employees.

13. Products requirements:

Products: Means new material, machinery, components, equipment, fixtures, and systems forming Work. Products does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

14. Product Selection:

Supply products that meet the performance requirements outlined in the Contract Documents and those recommended in writing by the manufacturer for the intended purpose. The materials and equipment to be utilized in the project must be of the highest quality, representing the latest models of standard products from reputable manufacturers, and must not exhibit any signs of defects or impurities.

Whenever possible, select standard products that have been successfully employed in similar installations on previous projects. In cases where a Supplier is expected to match a provided sample, the final determination of the acceptability of the proposed product's match to the sample will be made by the PURCHASER.

15. Transportation & Handling

Transport and manage products following the manufacturer's guidelines all the way to the installation site.

Examine incoming shipments to ensure that the products meet the specified criteria, are free from damage, and arrive in the correct quantities.

Supply the necessary equipment and personnel to handle the products, utilizing methods that prevent any contamination, defacement, or harm

16. Technical Specifications for RTO Islamabad

Data Center Critical Physical Infrastructure:

The primary objective is to construct a highly advanced Data Center that complies with Tier/Rated III standards, as outlined in the TIA 942-B guidelines. This Data Center should incorporate N+1 redundancy and aim for an availability rate of 99.982%. Consequently, bidders should view the provided product and service descriptions as the bare minimum requirements.

Each bidder is strongly encouraged to include in their proposal any products or services they deem necessary or beneficial, whether in addition to or as alternatives to those explicitly mentioned in this bid, in accordance with the TIA-942-B standards.

Interested bidders must visit the site on the specified date and time indicated before submitting their proposals. This site visit will enhance their understanding of the technical specifications and the quantities/design of products/items that need to be finalized

Following table will be used as guideline of power consumption of IT load in the data center.

	Number of IT rack	Load per rack(KW)	Total IT Load (KW)
POD- 1	18	6	108
POD-2	10	5	50

17. IT Racks

Product/System Description

Each cabinet shall be designed to provide a secure, managed environment for server and networking equipment. Cabinets shall be designed to accommodate power and cable management accessories that keep network and power cables separate and organized

Design Requirement

Physical Specifications:

- Cabinet dimensions, equipment mounting compatibility and weight load ratings:

Internal Height	Internal Width	External Height	External Width	External Depth	Static Rating	Dynamic Rating
42U	19”	1991mm	600mm and 800	1070mm to 1100mm	2000kg to 2200 kg	1200kg to 1500 kg

Above are minimum requirements.

Material Requirements

- All weight bearing components shall be constructed from steel with a thickness no less than > 1.2mm.
- All sheet metal parts shall be painted using a powder coat paint process.
- Plastic materials shall meet or exceed Underwriters Laboratory’s UL94 standard HB rating.
- All interior components of the cabinets shall not have electroplated zinc coating to minimize zincwhiskers near active equipment.
- The cabinet posts should be made of eight-folded profiles by one-off roll forming.

Access and Installation:

- The unit shall provide 42U of equipment vertical mounting space.
- The vertical mounting rails shall be easily adjustable to allow different mounting depths.
- The unit shall include M6 caged nuts, bolts and cup washers, and caged nut tool for the mounting ofequipment inside the unit.
- Both the front and rear doors shall be designed with lift-off hinges allowing for quick and easydetachment without the use of tools.
- Split rear doors are provided for increased service clearance.
- The unit shall include half-height side panels that are removed without tools
- Grounding: All cabinet components such as doors, side panels, roofs, etc. shall be bonded directly to theframe.

18. Ventilation

- The unit shall have ventilated front and rear doors to provide adequate airflow required by the major server manufacturers.
- The unit shall have a minimum total ventilation area for the front door and split rear doors as specified in the table below:

Internal Height	External Width	Perforated Front Door	Perforated Rear Door
42U	600mm	6000 cm^2	6700 cm^2
	800mm	6000 cm^2	6700 cm^2

19. Cable Access

- Top cable management openings provided in the cabinet roof.
- Cable opening edges shall be protected with plastic grommets.
- Bottom cable management opening provided in the cabinet base.
- Side cable management opening shall be provided in the cabinet base. A minimum of two and maximum of four vertical PDU mount cable organizers shall be offered.

20. Environmental

- The unit shall have a minimum of IP 20 rating for protection against touch, ingress of foreign bodies, andingress of water.
- RoHS compliant.

21. Security

- Each cabinet to be provided with optional feature of access control system through finger print and IC card swapping feature.

22. Stabilization

- The unit shall ship with provisions for stabilization in the field using the pallet mounting brackets.

- The unit shall have four (4) adjustable leveling feet to help provide a stable base in the event of an unevenfloor surface and to prevent rolling.

23. Hot / Cold Aisle Containment System

System/ Product description

Supporting aisle widths range from 3 to 6 feet (900 mm – 1830 mm).

Ceiling Panels

- Ceiling panels shall be clearpanels with aluminum framing OR with full glass design
- Minimum Light Transmission 85% or greater.
- Ceiling panels shall be designed to be supported by the frames of the IT Equipment racks. Ceiling Panel frames sizes shall be suitable to match up with various rack widths, row width, and hot/cold aisle widths.
- The ceiling system shall be designed to permit removal of the ceiling panel from within the contained zone without the use of tools for service access to the space above the aisle.
- Drop/revolving type resettable ceiling panels for penetration of fire suppression gas in case of a fire

Rack Equipment Baying kit

Metal and plastic components shall be supplied to establish consistent spacing between the racks or rack based equipment, and to fill the space to provide an air containment seal at the juncture between two adjacent racks or rack based equipment.

Door Frames and Doors

- Metal door frames and doors shall be provided to establish air containment at the end of two rows of racks. The door frame system shall match the height of the rack-based equipment and match the design width of the contained aisle.
- Doors shall be sliding, to permit access into the contained aisle for maintenance or servicing. Standard door operation shall not interfere with access or service on any rack or rack-based equipment.
- Doors shall be provided with a minimum 8mm thick glass window, handles and latches. Door locks and three matching keys per door
- Proximity switches for open/closed status
- Automatic door closure system for sliding door
- Sliding Doors shall be provided with swing-open functionality in case of emergency inside the aisle.

Frames and Components seal

Adequately seal Aisle joints, minimize open gaps between containment system components, IT Equipment racks and rack based equipment.

Fire Safe Ceiling

- The Ceiling System complies to UL484, EN 55022, EN 55024, EN 61000-3-2,EN 61000-3-3, EN 60950-1, CFR 47 FCC Part 15:2011, ANSI C63.4, ICES-003, AS/NZS CISPR 22.

- Ceiling material should be fire resistant
- Ceiling panels can be fixed or rotated (automatically controlled by the magnetic locks)
- In case of fire, the magnetic locks open and rotating ceiling open automatically due to gravity force. The design ensures that fire extinguishing gas enters the hot aisle containment.

Lighting

- Lighting should be provided in the containment.

Specification

a. Watts = 5-7

b. Lens = frosted

c. Lumens per foot > 180

Sensor and camera

Aisle should be installed with the camera, temperature and humidity sensor, smoke detector, aisle lighting, infrared sensor, and reserved hole for fire extinguishing nozzles

24. Rack Power Distribution Unit

Product /system description

For purposes of distributing power within an IT enclosure, rack mount power distribution units shall be available for installation within the IT enclosure. The rack mount power distribution units shall be capable of being installed in the back of the accompanying enclosure to consume zero U- space in the rear of the rack and shall not require tools for installation within the rack.

Design requirement

- **Single phase**

A. **Rating:** 32A - 1Phase
B. **Type:** Metered & monitored
C. **Input Voltage:** 230 VAC 1 Phase
D. **Input Frequency:** 50Hz
E. **Input Connection:** IEC309 32A
F. Output Connections C13 ≥12 & C19 ≥3
G. **Mounting** Vertical Zero U

A. **Rating:** 16A - 1Phase
B. **Type:** Metered & monitored
C. **Input Voltage:** 230 VAC 1 Phase
D. Input Frequency: 50Hz
E. **Input Connection:** IEC309 16A
F. **Output Connections:** C13 ≥ 12 & C19 ≥3
G. **Mounting:** Vertical Zero U

- **Three Phase**

A. **Type:** Metered & monitored
B. **Rating:** 32A - 3Phase
C. **Input Voltage:** 400 VAC 3 Phase
D. **Input Frequency:** 50Hz
E. **Input Connection:** IEC309 32A
F. Output Connections C13 ≥12 & C19 ≥3
G. **Mounting** Vertical Zero U

Required Features:

a) Low-profile in depth
b) Environmental monitoring port for external temperature/humidity monitoring (optional)
c) Full-featured network management capability via web, SNMP
d) User-interactive LCD display for local access
e) Field-replaceable network management module (preferred)
f) Active current measurements (amps)
g) Active power measurements (including volts, amps, real power (kW) and energy (kWh))
h) User-customizable alarms and warnings
i) Embedded log memory to record/review/report
j) Compliance: CE EN55035, EN55032, EN55024, CE, TUV, EN/IEC62368-1, RoHS & Reach

25. Uninterruptible Power System

Product/System description

Three-phase, double conversion on-line, continuous operation, solid state uninterruptible power supply (UPS). It will provide power conditioning and on-line power protection for the critical loads. UPS will of modular hot swap construct. Power module, static transfer switch, and management module shall be hot swap without transferring the unit on by pass.

Design requirements

The UPS shall be housed in a freestanding cabinet. Maintenance shall be possible from the front and the rear.

- 3-Phase Modular UPS 25kW scalable to 300 kW, 400 V, with bypass switch hot swappable
- Output power factor: 1.0.
- The UPS shall support installation with either 3-wire (L1, L2, L3, PEN) or 4-wire (L1, L2, L3, N, PE).
- The UPS shall contain a static bypass switch and a display. The UPS shall be of the double conversion on-line topology with power factor corrected inputs.
- The UPS shall be sized for **160kW** rating plus one additional module.
- The UPS battery shall be sized for 30mins backup @0.9PF
- The UPS shall be using a modular design in which power functions, static bypass, and system control are embedded in modules for optimal MTTR.
- UPS must support to run at least 4 UPS in parallel
- The system can detect bus capacitor rest running life and give alarms before the capacitor failure
- External Service Bypass Panel

System input

- Nominal input voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V). Input voltage window: 305 V to 485
- Input frequency range: 40-70 Hz.
- Input power factor: 0.99
- Total harmonic distortion: < 3 % (linear load)

System output

- Nominal output voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V).
- Output voltage tolerance: +/- 2% for symmetrical loads; +/- 3% for asymmetrical loads.
- Dynamic load response: +/- 5% after 2 ms; +/- 1% after 50 ms
- Output frequency: Synchronized to mains over the range of 45-65Hz in normal operation, ± 0.5 Hz in battery operation
- Output voltage harmonic distortion:
- <3% at 100% linear load
- <3% at 100% non-linear load
- Overload capability:
- 150% for 1 minute (normal operation)

- 125% for 10 minutes (normal operation)
- 125% for 1 minute (battery operation)
- 110% 60 minutes (bypass)
- Output power factor: 1.0
- Audible noise at full load: < 75 dB

26. Operation Modes

- **Normal:** In double conversion operation, the UPS supports the load with conditioned power
- **Battery:** If the utility/mains supply fails, the UPS transfers to battery operation and supports the load with conditioned power from the DC source.
- **Requested and Forced static bypass**: The UPS can be transferred to requested static by pass and forced by pass available
- **Internal Maintenance Bypass:** UPS shall have internal maintenance by pass available
- **External maintenance bypass**: When UPS transfers to external maintenance bypass operation. The load is supplied with unconditioned power from the bypass source. Service can be performed on the entire UPS during external maintenance bypass
- **ECO mode:** UPS shall have Eco mode operation option

Components

Rectifier

- The UPS shall include an active power factor corrected rectifier.
- The battery charging voltage shall be compensated against temperature variations (battery temperature compensation) to always maintain optimal battery float charging.
- Input power factor shall be 0.99 lagging at 100% load without the use of passive filters. Rectifier shall employ electronic waveform control technology to maintain the current sinusoidal.
- Pulse Width Modulation (PWM) current control shall be used. Digital Signal Processors (DSP) shall be used for all monitoring and control tasks.

Inverter

- The inverter shall consist of fast switching IGBTs.
- Inverter shall be PWM controlled using DSP logic.
- The inverter modules shall be rated for an output power factor at 1.0.
- Nominal output voltage shall be 400 V 3-phase (adjustable for 380 V, and 415 V).

Static bypass switch (hot swappable)

- The static bypass switch shall consist of fully rated Silicon Controlled Rectifiers (SCRs).
- The static bypass switch shall be of modular design.
- The static bypass switch shall automatically transfer the load to bypass supply without interruption after the logic senses one of the following conditions:
    - Inverter overload beyond rating.
    - Battery runtime expired and bypass available.
    - Inverter inoperable.
    - Control system inoperable.
- The static bypass switch shall automatically retransfer from bypass to the inverter.

Battery

- The UPS support 30 min backup time @ 0.9PF.
- The Lithium battery shall be of LFP type
- Monitoring required at battery module level, battery cabinet level and UPS system level.
- 5-7 Inches LCD display or equivalent display system
- High energy density
- The entire system complies with CE/CB/ROHS/REACH
- The cells comply with UL1642、IEC62619、UN38.3 and provides the certificate
- Shall comply with Internal short circuits, fire resistant, overcharging, high-temperature short circuiting, compression testing, drop testing, heating trials, temperature cycling evaluations, shock resistance, vibration resistance, low air pressure conditions, and high-power charging tests
- Provide third-party test reports
- Cells acupuncture test report verified from renowned third party, ·
- Battery string in the lithium battery cabinet has fuses and circuit breakers for protection.
- Lithium battery cabinet is configured with BMS system
- Battery monitoring shall be provided at the system level and also Battery module level monitoring
- Batteries use natural heat dissipation.
- Batteries can be installed against walls.
- IPX1 protection level with third-party report.
- CE certificate
- Shock proof certificates
- Fire protection system built-in within cabinet or module level.
- The UPS shall incorporate a battery capacity test that will determine the available runtimes.
- Minimum 10 years design life

Mechanical

- The UPS shall be housed in a freestanding cabinet with casters.
- The cable entry shall be from the top/bottom of the UPS.
- The cabling section shall be large enough to accept different type of cables.
- The UPS shall have ingress level of minimum IP20.
- The UPS shall have a seismic kit option.

Display, controls, and alarms

- A color 5-7 LCD touch screen for operation and monitoring
- Monitoring key parameters like input voltage, current, frequency, output voltage, current, and battery status (voltage, current, temperature).
- The display shall provide user-friendly access to status information and active alarms in various operational modes, including Normal, Battery, Bypass, Overload, Battery Discharging, and Low Battery Voltage.

Accessibility

Software and connectivity

- The Ethernet Web/SNMP Adaptor shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments.
- The UPS shall have option of Modbus interface.
- The UPS shall be equipped with dry contacts (inputs, outputs) for user-assignable alarms or remote monitoring.

Remote UPS monitoring

- Web monitoring: Remote monitoring shall be available.
- Simple Network Management Protocol (SNMP)

Software compatibility

- The UPS manufacturer shall have available software to support shutdown and or remote monitoring.

Parallel capability

Up to 4 units

Warranty

5 years for UPS (all components) & 5 years for batteries

External service bypass shall be provided

Approvals

IEC 62040-1: 2017, Edition 2.0, Uninterruptible Power Systems (UPS) - Part 1: General and safety requirements for UPS.

EN IEC 62040-1: 2019 | A11:2021.

IEC 62040-2: 2016, Edition 3.0, Uninterruptible Power Systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements.

EN 62040-2:2018, Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-3: 2021-03, Edition 3.0, Uninterruptible Power Systems (UPS) - Part 3: Method of specifying the performance and test requirements.

IEC 60721-4-2 Level 2M2

Factory testing

Factory test report shall be provided for the components and complete unit.

27. Modular Power Distribution for UPS Output

Product/System description

- The PDU shall provide a mechanical means of complete isolation of the input source from the critical output distribution.
- The PDU shall contain the appropriate modular distribution panel within a Rack enclosure suitable for installation in a data center environment.
- Factory assembled and tested
- All system components are housed in a Rack
- The PDU and associated equipment shall operate in conjunction with a primary power supply to provide quality uninterrupted power for mission critical, electronic equipment load.
- All programming and miscellaneous components for a fully operational system as described in this Section shall be available as part of the PDU.
- Real-time monitoring over the status of branches: voltage, current, power, load rate, temperature of each terminal of circuite breaker, status of switches, send alarm when the temperature is abnormal.

Design requirement

- Input: AC Nominal Input Voltage: 400V/230V 3-phase, 3-Wire+N+G, 50/60Hz

- Input Switch: MCCB
- Architecture and construct : Dual bus architecture, IP 20
- System Capacity:
- The PDU shall support provide 200-250 kW output.
- Testing and quality assurance: All circuit breakers shall be 100% factory tested to ensure the highest quality for the PDU. In addition, the PDU shall be tested with 100% load and all panel circuit breakers shall be 100% tested.

Displays & Controls

- **Display unit:** PDU shall have a microprocessor-controlled 5 to 7 inch color display unit located on door in front of the system. The display shall consist of an alphanumeric display allowing retrieval of active alarms, system level programming,and event history of the PDU.
- **Metered Data:** The following data shall be available on the alphanumeric display:

  a) Year, month, day, hour, minute, second of occurring events

  b) Output voltage by phase

  c) Branch circuit status

  d) Current and power used by the load

  e) Load as a percentage of capacity

  f) Total energy usage

  g) Volt meter

  h) Power factor

  i) Alarms

  j) Log

  k) Harmonics

Alarms: The display unit shall allow to configure alarms and there threshold.

Remote Monitoring

The following methods of remote PDU monitoring shall be available:

- Web Monitoring: Remote monitoring shall be available via a web browser.
- RS232 Monitoring: Remote PDU monitoring shall be possible via RS232 serial port connection.
- Simple Network Management Protocol (SNMP).

Power Distribution

- Multiple power distribution options shall be available in the Power Distribution to cater the rack PDU.
- **Event log:** The display unit shall provide a time and date stamped logs.

28. UPS for NOC, SOC, System Room, Network Room and other IT load

Description

Three-phase, double conversion on-line, continuous operation, solid state uninterruptible power supply (UPS). It will provide power conditioning and on-line power protection for the critical loads. UPS will of modular construct.

Design requirement

The UPS shall be housed in a freestanding cabinet. Maintenance shall be possible from the front and the rear.

- 3-Phase UPS 60 kW, 400 V, with bypass switch
- Output power factor: 1.0.
- The UPS shall support installation with either 3-wire (L1, L2, L3, PEN) or 4-wire (L1, L2, L3, N, PE).
- The UPS shall contain a static bypass switch and a display. The UPS shall be of the double conversion on-line topology with power factor corrected inputs.
- The UPS shall be sized for 60 kW rating
- The UPS battery shall be sized for 30mins backup @P.F 0.9
- The UPS shall be using a modular construct design.
- UPS must support to run at least 4 UPS in parallel
- External service bypass

System input

- Nominal input voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V). Input voltage window: 305 V to 485
- Input frequency range: 40-70 Hz.
- Input power factor: 0.99
- Total harmonic distortion: < 3 % (linear load)

System output

- Nominal output voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V).
- Output voltage tolerance: +/- 2% for symmetrical loads; +/- 3% for asymmetrical loads.
- Dynamic load response: +/- 5% after 2 ms; +/- 1% after 50 ms
- Output frequency: Synchronized to mains over the range of 45-65Hz in normal operation, ± 0.5 Hz in battery operation

Output voltage harmonic distortion:

- <3% at 100% linear load
- <3% at 100% non-linear load

Overload capability:

- 50% for 1 minute (normal operation)

- 125% for 10 minutes (normal operation)
- 125% for 1 minute (battery operation)
- 110% 60 minutes (bypass)
- Output power factor: 1.0
- Audible noise at full load: < 75 dB

29. Operation Modes

- Normal: In double conversion operation, the UPS supports the load with conditioned power
- Battery: If the utility/mains supply fails, the UPS transfers to battery operation and supports the load with conditioned power from the DC source.
- Requested and Forced static bypass: The UPS can be transferred to requested static by pass and forced by pass available
- Internal Maintenance Bypass: UPS shall have internal maintenance by pass available
- External maintenance bypass: When UPS transfers to external maintenance bypass operation. The load is supplied with unconditioned power from the bypass source. Service can be performed on the entire UPS during external maintenance bypass
- ECO mode: UPS shall have Eco mode operation option

30. Components

Rectifier

- The UPS shall include an active power factor corrected rectifier.
- The battery charging voltage shall be compensated against temperature variations (battery temperature compensation) to always maintain optimal battery float charging.
- Input power factor shall be 0.99 lagging at 100% load without the use of passive filters. Rectifier shall employ electronic waveform control technology to maintain the current sinusoidal.
- Pulse Width Modulation (PWM) current control shall be used. Digital Signal Processors (DSP) shall be used for all monitoring and control tasks.

Inverter

- The inverter shall consist of fast switching IGBTs.
- Inverter shall be PWM controlled using DSP logic.
- The inverter modules shall be rated for an output power factor at 1.0.
- Nominal output voltage shall be 400 V 3-phase (adjustable for 380 V, and 415 V).
- Static bypass switch
- The static bypass switch shall consist of fully rated Silicon Controlled Rectifiers (SCRs).
- The static bypass switch shall automatically transfer the load to bypass supply without interruption after the logic senses one of the following conditions:

  Inverter overload beyond rating.

  Battery runtime expired and bypass available.

  Inverter inoperable.

  Control system inoperable.

The static bypass switch shall automatically retransfer from bypass to the inverter.

Battery

- The UPS support 30 min backup time @ P.F0.9
- Lead acid maintenance free battery (VRLA)
- Battery Monitoring required at cabinet level
- Deep cycle (80% DOD > 400 Cycle)
- 10-12 years design life

Mechanical

- The UPS shall be housed in a freestanding matching cabinet with casters.
- The cable entry shall be from the top/bottom of the UPS.
- The cabling section shall be large enough to accept different type of cables.
- The UPS shall have ingress level of minimum IP20.
- The UPS shall have a seismic kit option.

Display, controls, and alarms

- A color 5-7 LCD touch screen for operation and monitoring
- Monitoring key parameters like input voltage, current, frequency, output voltage, current, and battery status (voltage, current, and temperature).
- The display shall provide user-friendly access to status information and active alarms in various operational modes, including Normal, Battery, Bypass, Overload, Battery Discharging, and Low Battery Voltage.

Software and connectivity

- The Ethernet Web/SNMP Adaptor shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments.
- The UPS shall have option of Modbus interface.
- The UPS shall be equipped with dry contacts (inputs, outputs) for user-assignable alarms or remote monitoring.

Remote UPS monitoring

- Web monitoring: Remote monitoring shall be available.
- Simple Network Management Protocol (SNMP)
- The UPS manufacturer shall have available software to support shutdown and or remote monitoring.

Parallel capability

Up to 4 units

Warranty

5 years with batteries

External service bypass shall be provided

Approvals

IEC 62040-1, IEC 62040-2, IEC 62040-3, IEC 60721-4-2 Level 2M2

Factory testing

Factory test report shall be provided for the components and complete unit.

31. Cooling Units for Data Center

Summary

The environmental control system must be purpose-designed for precise temperature and humidity regulation. It will autonomously oversee and regulate heating, cooling, humidification, dehumidification, and filtration within the controlled space. The system must adhere to the most stringent engineering and manufacturing standards, and it should be floor-mounted (Inrow) with a configuration for horizontal airflow, enabling a draw-through air pattern to ensure uniform air distribution across the entire coil surface. Complete CFD analysis shall be the part of proposal.

32. Design Requirements

The system shall be as described in the following specification as manufactured.

- 30-35 KW or higher sensible cooling 24-29KW at 46C ambient / outdoor temperature
- Cabinet width = 300mm
- Air Volume: >/= 3300-3600 CFM
- Humidifier capacity: 1.5-2 kg/hr.
- Reheat capacity: 4 kW
- Electrical supply: 400 V, 50 Hz.
- The Cooling unit must be equipped with surge protection device.
- Built in Dual power supply with display. The precision cooling units should have power detection functions overvoltage, under voltage, high frequency, and low frequency), fault diagnosis, alarm recording, automatic protection, automatic recovery, and automatic restart functions.

Cabinet Construction

- Exterior panels shall be 16-18 gauge steel with insulation.
- The frame shall be constructed of 15-16 gauge formed steel welded for maximum strength.
- All units shall provide maintenance from the front and rear, allowing units to be placed within a row of racks. All exterior panels and frame shall be powder coated for durability.
- Units shall include casters and leveling feet to allow ease of installation in the row.

Fans

Variable speed DC fan with built in n+1 redundancy.

Microprocessor based monitoring, configuration control and alarm system:

- Display shall allow monitoring and configuration of the air conditioning unit through a menu based control. Functions include status reporting, set-up, and temperature set points.
- Controls: The microprocessor controller allow the user to navigate between menus, select items, and input alpha numeric information.
- Alarms: Controller shall activate a visible and audible alarm in the occurrence of multiple events.

- Logging: The microprocessor controller shall log and display all available events. Each alarm log shall contain time/date stamp as well as operating conditions at the time of occurrence.

Network Management Card

- The unit shall include a network management card to provide management through a computer network through TCP/IP. Management through the network should include the ability to change set points as well as view and clear alarms.
- Units shall support Modbus TCP/IP and RTU.

Cooling Coil & Condensate Pan

- Cooling coil shall use raised lance type corrugated aluminum fin copper tube coils. Thick wall. Coil end supports shall be a minimum 17- 18 gauge galvanized steel. Coil shall be rated for a maximum pressure of 600-650 psig (4200- 4482 kPa), and the coils are certified in accordance with UL207 or equivalent safety standard Coil has brass distributor and copper distribution tubes.

Compressors

- Variable Speed Compressor, DC inverter or equivalent
- Supports adjust cooling capacity according to heat load.
- Compressor is electrically protected.
- Compressor utilizes a noise cap for noise reduction.
- Sight glass provided.
- Compressor shall soft start to minimize in-rush current.

Condensate Pump

- A single factory installed and wired condensate pump shall pump at 28-32 l/h at 4-4.5 m (13- 14 ft.) of head.

Condensate Reservoir

- Each pump shall have a condensate reservoir made of corrosion resistant material.

Filters

- The standard filters shall be 30% efficient per ASHRAE Standard 52.1 or 52.2,). Filters shall be EN779 G4 efficient. Filters shall be replaceable without shutting down the cooling unit.

Humidifier

Humidifier shall be able to modulate capacity. The humidifier shall be self-contained, steam generating type/ Infrared factory piped and wired, automatic solid-state control circuit. Humidifier canisters shall be replaceable. The humidifier controller shall communicate directly to the microprocessor controller and provide complete status and control at the operator interface. Humidifier shall control flush cycling and conductivity via automated controls. Humidifier shall be capable of producing up to (3-4 kg) of steam per hour.

Electric Reheat

- Reheat elements shall be low watt density, shall be electrically and thermally protected by both automatic and manual reset cutouts. Reheat capacity shall be 4 kW.
- Heating the air to bring it up to the room set point

- Maintain dry bulb temperature in the room during operation in dehumidifier mode.
- Reheat coils shall be stainless steel.
- Heater shall be provided with self-engaging electrical connectors upon installation.

33. Temperature and Humidity Sensors

- The precision cooling units should be configured with built-in temperature sensors and built-in temperature & humidity sensor to measure the temperature more accurately and increase system reliability. Temperature sensor accuracy shall be within +/– 1 degree F accuracy.
- Shall have internal Humidity Sensors

34. Ambient Protection

- InRow DX systems shall be equipped with a recommended outdoor flooded receiver package suitable for ambient temperatures down to -40C/-40F.

35. Cable Water Detector

- A leak detection sensing cable shall be shipped loose with the unit. If water or other conductive liquids contact the cable anywhere along its length, the main controller visually and audibly annunciates the leak.
- Water Leak Detection System (covering all potential areas of water leakages in Server, UPS and Telco Rooms & supporting automatic control of isolation valves/water supply in case of leak detection)

36. Alarms

- The system's comprehensive alarm list covers a spectrum of potential issues that could occur. They encompass various aspects such as cooling, air filtration, temperature, humidity, and pressure monitoring. Additionally, they cover faults related to sensors, fans, compressors, and other critical components.

37. Outdoor Unit Placement

- The condenser should be able to be placed in horizontal arrangement, up to 6-8m placement below In Row and 25-30m above in row unit.

38. Outdoor Unit Protection

- Have energy efficient fans. Complete units must be corrosion resistant and designed for the harsh environment. Conformal quoting shall not compromise the heat rejection efficiency of the unit.
- **Warranty:** 5 years comprehensive warranty for complete system

39. Cooling Unit for Power Rooms

40. Summary

The environmental control system will be purposefully designed to excel in regulating precise temperature and humidity within the designated space. This system will have the capability to automatically oversee and manage functions like heating, cooling, humidification, dehumidification, and air filtration.

Moreover, it will adhere to the most stringent engineering and manufacturing standards. The system will be floor-mounted and configured to provide conditioned airflow with a front-flow/horizontal discharge, with the option for (front), (bottom), or (rear) return airflow.

Design Requirement

The system shall be as described in the following specification as manufactured.

1. Sensible net cooling capacity: 20-25 kW
2. Air Volume: 2400-2700 CFM
3. Humidifier capacity: 2-3 kg/hr.
4. Reheat capacity: 3-6 kW
5. Electrical supply: 400 V, 50 Hz
6. Air flow discharge: Front Flow
7. Must have built-in Dual input power
8. Must have built-in surge protection min 6 KV

41. Cabinet and Frame Construction

The framework, electrical panel frame, and internal parts of the unit frame shall be constructed from hot zinc plated sheet steel connected by rivets to ensure durability and stability. Internal panels coated with epoxy-polyester paint to isolate compartments affected by the air flow. The external panels are coated with epoxy-polyester paint, which ensures long-term durability of the original features.

The standard panels shall be lined internally with heat and sound proofing and has excellent sound-insulation properties

42. Return Air Filters

The standard filters shall have a EU4 filtering rating, have to be mounted upstream from the cooling coil inside the unit, and to be easy to remove. EU5 & EU8 rated filters option available with the unit.

43. Fans

- EC Centrifugal fans
- The fans shall have high performance, very low power consumption and low noise level
- The performance data to exceed ERP 2015 requirements

44. Controller

- The control system shall have e 4-7 inch touch-screen display interface.
- The microprocessor control board shall contain the settings and programs of all the stored operating parameters which can be used, viewed, and set on the user display interface.
- The user interface touch screen display shall be externally mounted, password protected, and menu driven.
- The user interface shall allow modification of adjustable parameters.
- The user interface shall have integrated USB port for easy upgrade of the software and data download
- The user interface shall be integrated with TCP/IP. Compatible with Lon Works Module or RS485 Module (Modbus RTU or BACnet MS/TP). Operating parameters, monitor the trend of the main working parameters, and view alarm messages are possible through controlling panel.

45. Network Management Card

- The unit shall include a network management card with TLS 1.2 cybersecurity. Provide management through a computer network through MODBUS or BACnet TCP/IP.

- Group control
- Up to 8-10 indoor unit shall be grouped together via A-link to share operational set points and commands.
- Group control shall automatically rotate units into standby mode based off run-hours when IT load is not high enough to require all units to be active.

46. Control System Functions

- Temperature and Humidity Control based on adjustable set points.
- Alarm signaling local or via remote
- Alarm History, logs 90-100 recent events with date and time stamp
- Alarm signal contacts configured on the User Interface
- Calculating operating hours and start-up cycles of major components
- "Automatic Restart" after power is restored
- Remote switching on/off of the unit

47. Password protection

- Hour Meter calculates operating hours and start up cycles of major components
- View status of all unit components and sensors connected to the control board.
- The rotation of the units can be made according to the a fixed cycle time or in case of alarm.
- "Manual Override" function shall allow manual control of the main components without excluding possible remote control.
- Symbols appear on the user interface to show status of unit and components.
- Potential of setting a dual set point for temperature (in both cooling and heating) and humidity (both when dehumidifying and humidifying), which can be modified from a remote terminal.
- Flexible management of the digital alarm outputs providing the possibility of independently addressing all available outputs (usually two) and to determine if the contact state must usually be open or closed

48. Set Points

Temperature and humidity set points shall be pre-set at the factory so the control functions correctly, maintaining standard conditions in the room.

49. Alarms/Events

The microprocessor controller shall activate a visible and audible alarm in the occurrence of set point violations related to equipment components performance, environmental set points, operational set points and points.

50. Logging

The microprocessor controller shall log and display all available events. Each alarm log shall contain time/date stamp as well as operating conditions at the time of occurrence. Controller shall display the run time hours for major components

51. Compressor

- The Room Cooling Direct Expansion (DX) systems shall utilize DC inverter/ Digital scroll/ Scroll compressor.
- A solenoid valve shall be included on each liquid line to avoid liquid migration to the evaporating section of the system
- Liquid receiver with rota lock on-off valve and safety valve

52. Refrigerant

The refrigeration system shall be designed to use R-410A.

53. Evaporator Coil

The evaporator coil shall be designed with a large front surface area in order to have an elevated SHR and a low air velocity through the coil. This prevents condensation carry over and reduces internal pressure drop in the unit and ensures a more efficient heat exchange during both the cooling and de-humidification. The evaporator coil shall be made from copper tubes mechanically expanded on aluminum fins.

Preferably coil shall be positioned upstream from the fans and shall have a stainless-steel condensate drain pan with a flexible drainage tube and an integrated siphon.

54. Direct Expansion Air Cooled System

Air-Cooled Systems

- The indoor unit shall consist of an evaporator section including evaporator coil, fans section, controls, electrical section, and refrigerant piping internal to the evaporator coil and compressor will be sealed with a positive pressure of dry nitrogen.
- Refrigerant piping required for interconnecting the evaporator and condenser sections shall be field supplied and installed to include the refrigerant R-410A required to charge the system.

Remote Air-Cooled Condenser(s)

- Shall be designed for high ambient temperatures operations of 46°C.
- Shall be a single or dual refrigerant circuit with copper tubes and aluminum fins, complete with low speed axial fan(s) to reduce the sound pressure level.
- Frame shall be made of galvanized steel with epoxy powder coat with weather-resistant capabilities.
- Electrical enclosure shall be weatherproof with a main disconnect mechanically interlocks with the electrical panel.
- Axial fans shall be fused and have heavy gauge, vinyl-coated, steel wire fan guards.

Humidification

- Steam/ infrared generating humidifier shall be able to modulate capacity.
- Humidifier shall be self-contained, factory piped and wired, with automatic solid-state control circuit.
- The humidifier controller shall communicate directly to the microprocessor and provide complete status and control at the user interface (LCD display).
- Humidifier canisters shall be disposable.

Heating system

- Electric Heat operate in stages to optimize the energy utilization and limit overheating there by increase their durability.
- Heating the air to bring it up to the room set point
- Maintain dry bulb temperature in the room during operation in dehumidifier mode.

- Condensate Pump shall fitted with humidifier. Have a capacity of 900-950 LPH at 0 m with a maximum lift of 6-7 m. Pump shall be designed with an integral dual float switch, pump and motor assembly.
- Unit shall have a Leak Detection Sensor

Network Management Card

- The unit shall include a network management card to provide management through a computer network through TCP/IP.
- Units shall support Modbus TCP/IP and RTU.

Warranty

5 years comprehensive warranty for complete system

55. DCIM & Environmental Monitoring System

56. Summary

- This specification outlines the operation and capabilities of a Data Center Infrastructure Management system (DCIM), which is referred to as the DCIM. The DCIM will be a centralized server appliance, equipped with a client console or web client.
- The architecture of this system should facilitate the expansion of the number of devices it can manage. It must be designed to effectively manage devices present on both the public LAN and the private LAN. Additionally, the system should have an architecture that allows for the monitoring of a variety of devices, including Multi-Vendor Simple Network Management Protocol (SNMP) devices, Modbus TCP devices, and Modbus RTU devices connected to a Modbus RTU-to-Modbus TCP gateway.
- Management Protocol (SNMP) devices, Modbus TCPdevices, and Modbus RTU devices that are connected to a Modbus RTU-to-Modbus TCP gateway.
- This specification shall provide infrastructure management of the Uninterruptible Power System (UPS); Power Distribution Unit (PDU); Rack PDU (rPDU); Computer Room Air Conditioning (CRAC); In-row Cooling; Environmental Sensors; Automatic Transfer Switch (ATS) with supplied Generator; SNMP devices from multiple vendors (ex. UPS, PDU, CRAC, CCTV, Access Control, VRF, Fire, LV Distribution, and rPDU);Modbus devices, allied infrastructure equipment and systems.
- The DCIM and associated equipment shall operate in conjunction with an existing network infrastructure to provide system management of the systems described above.

57. Design Requirement

- All materials and equipment employed must consist of standard components that are commonly manufactured, readily available, and not uniquely designed for this particular project. The data center infrastructure system, including the DCIM, should have undergone comprehensive system testing and demonstrated its functionality in real-world applications before being installed on this project
- The DCIM shall be a server appliance, or a virtual appliance, with a specified HTTP or HTTPS connection to access the user interface, and standard TCP protocol connections fornotifications.
- The server appliance system shall be scalable up to 500-600 managed/monitored devices.
- The manufacturer will supply an off the shelf management system that will require no factory

customization to meet customer requirements.

- The system architecture shall be scalable, allowing for future enhancements.
- The DCIM shall manage/monitor devices both on a public LAN and on a private LAN createdby the management system.
- The DCIM shall be capable of hosting additional add-on modules that support a Building Management System (BMS), a Power Management System, and allow a user to perform Physical Threat and Environment Management and Surveillance.
- The DCIM shall be capable of integrating with other management systems.

58. Modes of Operation

- **System Overview:** The hardware server DCIM shall be a centralized server appliance that is accessed remotely from a mobile device or client workstations/servers via a HTTP or HTTPS connection. The virtual appliance DCIM shall be a centralized application that is accessed remotely from client workstations/servers via a HTTP or HTTPS connection. No client-based services shall be used as a substitute. Microsoft System Center Operations Manager, Microsoft System Center Essentials, IBM Tivoli, HP Operations Manager, integration shall be supported. A Web Services Open API guide shall be made available by the DCIM vendor. The DCIM shall send alerts from the devices it manages to a valide-mail account accessible via mobile device; web page via HTTP POST; an FTP server; SNMP traps to a Network Management System
- **Modbus:** The DCIM shall provide access to MODBUS TCP Output Moduleused to support the Building Management System (BMS).
- The DCIM client application shall provide a Monitoring perspective and Surveillance perspective to display device status, device data, device events, and surveillance video; an Alarm Configuration perspective to provide notification options; a Reports perspective to access reports about monitored devices and provide configuration and graphing/trending options; and a Power Management perspective.

59. Monitoring Perspective

Device Groups

- The user shall be able to define groups. This shall allow a user to add groups, to all Devices group or on a sub groupand select Create Device Group.
- The user shall control access to each of the groups by defining the usersthat have access to that device group.
- Devices shall have the ability to reside in multiple groups.

Device View

- The DCIM shall display all discovered devices in a separate window and display device status of normal, warning or critical. This status shall be realtime status and updated as events occur.
- The Device View shall display the total number of discovered devices andthe number of displayed devices.
- The Device View shall allow the user to sort the displayed columns.
- The Device view shall allow the user client preferences to highlight a devicethat is in a critical state.
- The Device View shall have user-selectable columns.

- The user can :Add Devices, Delete Devices, Remove from Device Group Outlet Control, View Device Sensors, Request Device Scan, Show Alarm History, Generate Sensor History Report and graphs, Create threshold, SNMP Device Configuration, Appliance Configuration, Change Device Type, Add Custom Property
- The Device View pane shall contain a free text field to search for devices.

60. Reports Perspective

- Data shall be collected for the Uninterruptible Power System (UPS), Power Distribution Unit (PDU), Rack PDU (rPDU), Computer Room Air Conditioning (CRAC), Environmental Sensors, Automatic Transfer Switch (ATS) with supplied Generator, Surveillance Camera's Multi-vendor SNMP devices (UPS, PDU, CRAC, and rPDU), and other infrastructure systems as specified.
- Data collected over time must be stored on the server appliance for extracting and trending and /or can be exported to a Network Attached Storage Server (NAS).

61. Configuration

- The DCIM Should be capable of device recovery, mass configuration of devices, and mass update of the devices.
- The DCIM shall have the ability to be scaled to manage up to 3500-4000 devices,with additional device licenses.
- The user shall have the ability to view events from the entire DCIM from anAlarms view.
- The user shall have the ability to click on a managed device in an alarm state and display the specific nature of the alarm in an Alarm Details pane.
- The user shall have the ability to configure notification for managed devices
- The user shall have the ability to acknowledge active alarms and suppressfuture notifications.
- The DCIM shall have SMS support,
- The DCIM shall contain an Alarm History for all managed devices.
- The Alarm History shall display the Time Occurred, Time Resolved, Status,Description, Severity, Device Hostname, Parent Device, and Sensor.
- Shall have option to view device groups and subgroups, view the active alarms, access to view active alarm details, suppress and resume sending notifications.
- The DCIM web client shall provide a Home view to display customizeddata; a Monitoring view to display a hierarchical list of device groups and subgroups, and a list of active alarms; an Event Log view to display control, device, security, and system events; a Saved Reports view to display saved reports created on the installed client, and graphs for numericsensors; and a Search view to display data matching search criteria.

62. DCIM Security

- The communication between the client and the DCIM shall besecured via a Secure Sockets Layer (SSL) 168-bit Triple-DES (Data Encryption Standard) encoded connection.
- The DCIM shall have Open Lightweight Directory AccessProtocol and Active Directory support.
- The log in to the user interface of DCIM shall use Secure Socket Layer (SSL) or Secure Socket Handling (SSH) authenticate. The web launch to devices shall occur through a HTTP or HTTPS

connection. To increase security, the HTTP or HTTPS connection and the HTTP or HTTPS port shall be user configurable for each device, through the DCIM user Interface.

- The DCIM shall allow the user to create user accounts ranging from Administrator Access to View Only Access. The DCIM shall have no specified limit to the number of user accounts that can be created. Each of these accounts shall have their own unique login user name and password. An administrator shall have full read/write access to all the DCIM's functionality. The "View Only Access" users shall only have access, limited to viewing specific groups or devices within those groups, as well as creating graphing trending reports as well as exporting device data reports. The "Read Only" access user shall not be allowed to change the DCIM configuration or device configurations.
- The DCIM shall have the ability to communicate SNMPv1 or SNMPv3 to monitored/managed devices.

63. Environment Monitoring System

- The environmental monitoring solution shall protect computing equipment from physical threats such as high water leakage, temperature, humidity, smoke, both malicious and unintentional access events
- Water Leak covering all potential areas of water leakages in Server, UPS and Telco Rooms & supporting automatic control of isolation valves/water supply in case of leak detection
- EMS shall have infrared temperature and humidity sensors
- The EMS system shall integrate with racks and Data Center monitoring software for easy deployment, configuration, and management
- The system shall prevent equipment failure from a full range of threatening environmental conditions
- The system shall provide Real-time event notification that minimizes response times to critical physical infrastructure situations. Enables IT Administrators to reduce mean time to repair, improve efficiency, and maximize uptime
- Shall be able to customize threshold definitions (multiple thresholds per sensor, scheduling, severity levels) to requirements
- Shall be able to View the user interface with a browser. Provides quick access from anywhere on a secure network
- User-selectable password with strong password rules and reset password mechanism
- The central device shall Voltage and relay output, SNMP port and RS485 for monitoring
- The unit shall have console port and USB port for configuration

64. Fire Detection & Suppression System

- Fire Detection & Suppression System along with VESDA complied with requirements of NFPA 72/NFPA 75/ NFPA 2001, UL, EN 54 or Equivalent Standard
- Supply of UL listed and FM approved Automatic Novec1230 based Clean Agent Fire Suppression System @ 4.55% Design Concentration including piping, cylinders, controls, clean agent gas etc.
- Personal Protective Equipment: Gas Mask, Gloves, Gum boots, Sledge hammer, flash lights, soft mask)
- Portable Fire Extinguishers /Cylinders at designated locations of complete first floor
- Complete fire/ flame resistant paint on walls, roof as per EN-13501-1, EN 9001/2008
- Distributor shall be trained by the manufacturer to design, install, test and maintain the fire-alarm / -suppression system and shall be able to produce a certificate stating such on request.
- Intelligent Fire Detection & Aspiration/VESDA System

(i) Addressable Fire Alarm Control Panel.

The Supplier shall provide an addressable, Intelligence Fire Alarm Control Panel and fire-alarm / suppression system to perform the following operations:

- Fire-alarm-, supervisory-, and trouble-event initiation.
- Occupant notification.
- Event annunciation.
- Local control functions.
- Fire-extinguishing-system release, and
- Off-premises transmission.

An advanced, cutting-edge, intelligent digital peer-to-peer modular suppression control system is required. This system should be well-suited for applications related to life safety and property protection, catering to both commercial and industrial settings. It should boast a high degree of programmability, enabling rapid data relay and the efficient execution of various process management tasks, including HVAC shutdown.

The control panel should come equipped with two Signaling Line Circuits (SLC), each capable of supporting up to 254 devices. Furthermore, it should be expandable to accommodate four loops, ultimately providing the potential for a total panel capacity exceeding 1000 devices

(ii) Addressable Multi Detector.

Intelligent photoelectric/heat, spot-type smoke sensors should incorporate sensing chambers that leverage the principle of light scattering to detect smoke. These sensors should also be furnished with dual thermistors to enable heat sensing. The design of the sensing chamber should incorporate features that reduce the impact of settled dust on sensor performance.
Furthermore, these sensors should feature tri-color LEDs that serve as indicators of the detector's status. The detector can be programmed to display LEDs in a blinking pattern or as steady green, amber, or red lights.

(iii) Sounder / Horn Strobe.

The Selectable Candela Evacuation Signals consist of low-profile devices, including horns, strobes, or horn/strobe combinations, designed to provide reliable audible and visual alarms while consuming the least amount of current. The Selectable Candela Evacuation Strobe Horn/Strobe at 24VDC is capable of

offering field-selectable candela options, allowing choices of 15, 30, 60, 75, and 110 candela. For the 12VDC model, it provides selectable candela options of 15, 30, 60, and 75 candela.
Selectable Candela EvacuationSignals should have a minimal operation current and a minimum flash rate of 1Hz regardless of input voltage.

(iv) Manual Call Point.

Intelligent Manual Pull Station should be a state-of-the-art, dual-action (i.e., requires two motions to activate the station) pull station that should include an addressable interface (mounted inside) for fire alarm control panels. Because the pull station is addressable, the control panel should display the exact location of the activated device.That could lead fire service personnel quickly to the location of the alarm. The isolator should provide complete short circuit isolation as per NFPA 72, Style 7 wiring.

(v) VESDA.

VESDA smoke detectors incorporate cutting-edge detection technology, offering exceptionally early warning and superior nuisance alarm rejection for a diverse array of applications. These detectors are founded on Flair detection technology, and the manufacturer boasts extensive application experience, ensuring that the detectors consistently deliver high performance throughout their operational lifespan through absolute calibration

Configuration

- Every Room will be considered a separate zone.
- In a Zone Room Void / Ceiling Void / Floor Void detectors will be considered.
- Gas will not be released on 1st detector activation 1st alarm.
- Two detector activation will be required in a zone for gas release / discharge.
- Gas will not be released on 1st alarm even if the panel received multiple 1st alarms from different zones.
- HVAC units will be shut down on 1st alarm.
- All doors will be opened on 1st alarm with the help of an access control system.
- Gas will not be discharged on the VESDA alarm due to the sensitivity of the alarm.
- Email intimation can be received with the help of software.
- All devices can be monitored on precise vision software.

(vi) NOVEC1230 Fire Suppression Gas System.

M200 fire protection fluid extinguishes a fire by heat absorption. The gaseous mixturecreated when fluid discharges into air has a much higher heat capacity than air alone. The gaseous mixture absorbs large amounts of heat due to the high heat capacity andextinguishes fires by sufficiently cooling the combustion zone. It is important to note,NOVEC1230 fluid does not use the depletion or displacement of oxygen to extinguish a fire and therefore is safe for occupied spaces.

- Novec1230 cylinder and valve assembly.
- NOVEC1230 shall be stored in Engineered cylinders.
- Low & Discharge pressure switches shall be provided on cylinders
- NOVEC1230 cylinders shall be provided with the rupture disc.
- NOVEC1230 discharge nozzles will be made of brass or stainless steel.
- Cylinder size and nozzles size shall be according to the software generatedcalculations.

(vii) Portable Fire Extinguisher.

- CO2 5-kg cylinder shall be used for data center facility.
- DCP-6kg shall be used for general areas.
- LPCB Approved Fire Extinguishers shall be used.

65. Electrical components

66. Incoming Main Transformer:

The Power to the Data Center will be supplied with 02 Transformers for path A and B

Supply Installation, testing and commissioning of 630 kVA dry type Cast Resin transformers with enclosure for each path (A& B) as per following specs;

- Winding type : Copper.
- Core insulation : Cast resin vacuum casting
- Vector group : Dyn11
- Primary Voltage : 11Kv.
- Secondary Voltage : 415 V phase to phase.
- Frequency : 50 Hertz
- Impedance : 6%
- No Load Losses : 1650Watts
- Load Losses : 7600Watts
- HT Tapping range : ±5%
- Rated short time power frequency withstand voltage : 30Kv (RMS Peak)
- Rated lightening Impulse withstand voltage : 75Kv. (RMS Peak)
- The transformer shall be supplied with outdoor enclosure of IP65 rating.
- The applicable standard for dry type transformers is IEC 60076.

Following Test reports shall also be provided.

- Measurement of insulation resistance
- Measurement of winding resistance
- Measurement of voltage ratio and check of phase displacement
- Measurement of short-circuit impedance and load loss
- Measurement of no-load loss and current
- Separate-source AC withstand voltage test
- Induced AC withstand voltage test
- Partial discharge measurement
- Lightning impulse test
- Temperature-rise test
- Measurement of sound level

67. Generator

Output Ratings

- Genset Prime Power Rating 630KVA

Make/Assembler

- International renowned original brand/Manufacturer only. Supply and the manufacturing of Generators should be the same country as the original/actual OEM established in country of origin. No third party/country OEM is allowed in any case. Import documents will be required during the inspection.

Diesel Engine make

- Factory should be established and manufacturing engines over 40 years
- Brushless Single Bearing
- Aspiration: Turbocharged Air-to-Air After cooled

Alternator

- ~~Leroy Sommer or Caterpillar or Equivalent~~
- With respect to synchronous alternators designed to comply with the following standard: DECLARATION OF CONFORMITY
  - ENA EREC G99 standard application form from 27 April 2019
  - ENA EREC G5 Issue 4 standard application form from March 2001.
- Origin: UK, USA or Equivalent

Technical Data

Base Frame Type: Heavy Duty Fabricated Steel with Engine and alternator mounting on flexible rubber on a vibration absorbing steel frame

- Circuit Breaker Type: 3 Pole MCCB/ ACB Temperature 50°C
- Insulation Class: H
- Protection Class: IP 21
- Excitation System: Self Excited Brushless
- Starting System of Engine: SLI/Sealed Battery & Charging System
- Frequency: 50 Hz
- Engine Speed: 1500 RPM
- Built-in Fuel Tank Capacity: Should have 08-Hours continuous running
- Engine: 6 cylinder turbo charged, water cooled.
- Governor Type: Electronic.
- Performance: Must be G3 and verification required.
- Frequency: 50Hertz.
- Battery and starting system: 24V DC.
- Exciter type: Permanent Magnet (Rotary Type).
- Excitation Method: Shunt Excited.
- Circuit Breaker Type: MCCB/ACB, 3/4 Pole.
- Alternator: Single bearing synchronous type.

- The Electronic module should be either ”Deep Sea” or equivalent with all necessary protection of the Engine feature like speed, engine oil temperature, coolant temperature ,battery condition etc.

- Generators need to be set up in a parallel configuration, and the controller must oversee the scheduling between two generators to ensure an equitable distribution of operating hours.

- Canopy Type (Supplied by the OEM): The weather proof sound proof canopy shall be fabricated from 14 SWG galvanized steel sheets. After fabrication the canopy shall be powder painted at more than 75 microns. The canopy shall be supplied with the lifting and jacking arrangement. The door should be positioned in such a way that they provide no hindrance during routine maintenance

of the D.G set. The canopy shall be provided with residential type silencer capable of reducing sound level up to 75db at one meter distance from the enclosure.

(viii) Scope

The work under this section consists of supply, installation, testing and commissioning of all material and services of the complete Diesel generator set including Auto Main Failure (AMF) Panel and other equipment as specified.

General

- The Diesel generator set shall be a standard design of reputed manufacturer, who shall have similar units in operations for similar applications and field conditions. The manufacturer shall also have adequate maintenance facilities in the vicinity of Project with technically qualified and experienced personnel trained for operation and on-site maintenance of equipment offered by the Supplier in the tender bid.
- The engine shall be directly coupled to the generator, and shall have a rated speed of 1500 rpm. The set shall be capable of sustaining without damage, 25% over speed under any abnormal operating condition.
- The engine-generator set shall be mounted on suitable rigid steel frame skid with vibration isolators. Heavy duty lifting eyes and jacking screws shall be provided on the skid. The foundation bolts and all other material/hardware for complete installation of the set shall be furnished with the set. Any excessive torsional vibration shall be avoided for both engine and alternator.
- The set shall be suitable for full load starting. When the generator is operating at no-load, the application of full load current, taking into account the surge due to starting of equipment, should be possible with maximum transient voltage drop of 15% of the rated voltage, and the time taken to restore the generator voltage to 97% of rated value should not exceed 1.5 seconds.
- The set shall be capable for parallel operation.
- The Supplier shall submit the equipment layout and other installation details as per manufacturer's recommendations for approval of PURCHASER.
- Necessary provision, including connections and a Local / OFF / Remote control switch shall be made in the Generator Panel of each of the D.G. Set. The cost of such provision, connection, testing and commissioning are deemed to be included in the Cost of D.G. Sets and no separate payment shall be made against such works.

Applicable Standards & Codes

The Diesel engine and generator shall conform to the following standards as applicable.

BS 5514 - Reciprocating Internal Combustion Engine.
BS 4999 - General Requirements for Rotating Electrical Machines.
BS 5000-99 - Rotating Electrical Machines of particular types.

For other equipment and materials related to the Diesel generator set, the Supplier shall follow relevant international standards, details of which shall be submitted to PURCHASER for approval.

Diesel Engine

- The Diesel Engine shall be four strokes, compression ignition, suitable for continuous duty.
- Starting shall be through electric starter motor operated on DC supply from lead acid batteries mounted on the skid. The batteries shall be furnished with the set.

- The engine shall be equipped with an alternator type automatic charging system to charge the batteries during running of engine. A static battery charger installed in the control panel shall also be provided to charge the batteries when the engine is not running. Suitable interlocks shall be provided to prevent simultaneous operation of both charging systems.

- The batteries shall be adequate to satisfy the following requirements:

    - Crank the engine at firing speed for at least 15 seconds.
    - If the engine does not start on the first attempt, crank the engine two more times for the above duration at an interval of 30 seconds between each cranking operation.
- Engine shall be rated for continuous duty with overload capability for operating at least 10% above the rated capacity for 1 hour continuously in any 12 hours operation.

Air Intake

- Air intake shall be through turbo charger and equipped with dry type filter. Suitable attenuators shall be installed to reduce noise at the air inlet.

Engine Lubrication

- A gear type positive pressure lubrication pump shall be provided with efficient filtration arrangement for the lubrication system. A 230V AC mains operated heater with thermostat shall be provided in the crankcase.

- The heater shall be designed for automatic switching to ensure that temperature of oil is maintained for proper operation of the engine.

- Engine shall have a constant oil level regulator, gravity fed from an engine mounted lube oil reservoir. Reservoir shall be equipped with an oil level gauge. Size of the reservoir should be suitable for 30 days continuous operation at full load.

- A crankcase pressure release valve shall be provided to operate during excess pressure.

Engine Cooling

- Engine shall have a forced air draft, water-cooled radiator supplied with a core guard. Cooling system shall have an engine driven centrifugal pump for cooling water circulation. Cooling shall be thermostatically controlled. An engine shut down timer shall be provided to keep the engine running on no-load after any operation of set, so that the engine is sufficiently cooled to start again instantly, if required, without rise in temperature above safe limits.

Exhaust System, Noise, Pollution

- Exhaust system shall be equipped with a residential type silencer complete with muffler, exhaust manifold, flexible connector, exhaust elbow, exhaust pipe, rain cap, and associated fittings. The exhaust line shall be taken outside the building through the shortest possible and practical route, without any undue bends. This exhaust line shall be adequately covered with thermal insulation material over its entire length i.e. from the engine to the termination point. All supports for exhaust system shall be furnished.

- The sound level in the diesel generator room shall not exceed the values of the noise rating curve NRC 95 to ISO TI 43-1961 standard, measured at 1 m distance from the object but in no case greater than 85 dB (A) under all operating conditions.

- The exhaust fumes shall be burnt completely and be free of solid matters before escaping to the air.

Speed Governor

- The speed governor shall be electronic type. Governor shall regulate engine speed so as to maintain the generator frequency within plus or minus 2% of the rated frequency. Stable engine speed shall be attained within 15 seconds after the engine has been started. Stable engine speed shall be restored within 10 seconds of any sudden change in load, from no load to full load. During this change of load or surge, the speed shall not vary by more than plus or minus 5% of the rated speed.

Fuel System

- Engine of the generator shall operate on commercial high speed Diesel oil. A fuel oil strainer/filter shall be provided in the fuel line. Fuel system for Diesel engine shall be complete in all respect

Fuel Storage Tank

- Supply installation testing and commissioning of fuel tank for the storage of enough fuel for the consumption D.G Set for 48hour operations. The height of fuel tank shall be suitable for the flow of fuel under gravity.
- The fuel tank shall be fabricated from 14SWG sheet steel. After fabrication the tank shall be cleaned and degreased before power painting. The powder paint thickness on the tank shall not be less than 75microns. A clear glass tube shall be installed on the side of the fuel tank to show the level of fuel inside the tank.
- The level marking calibrated in liters shall be marked on the tank behind the glass tube.
- The tank shall have high and low level float switches for monitoring the fuel level in the tank. The high and low level switches shall provide an annunciation while the low level switch shall in addition to above annunciation also prevent starting of set and to stop the set when the fuel in storage tank is at this level. The tank shall be provided with overflow, vent, supply and discharge valves, inspection cover, drain valve and glass sight gauge.
- The fuel storage tank shall be of mild steel plates and shall be designed, fabricated and finished in accordance with the requirements of DIN 6608.
- Tank shall be capable to withstand maximum loads encountered during installation and operation for all conditions from empty tank to tank filled to capacity or overflow.
- Tank shall be in accordance with the relevant BOCA or UBC code requirement for seismic load whichever is more stringent.
- Tanks shall be capable to withstand safely the forces and moments imposed by connecting piping.
- The thickness of tank elements shall be increased over the thickness required by code requirements by 2mm for corrosion allowances.
- The tanks shall be of welded construction in compliance with specified DIN standard and/or section VIII of the ASME code, DIV I.
- The tanks shall be provided with at least two lifting eyes. Shell plate joints shall be butt welded with complete penetration and fusion. All joints in the attachments to the shell shall be fully seal welded to prevent rust staining.
- Sharp welds and sharp corners shall be ground smooth and blended into the base material. All bottoms of the shell connections shall be flush with the inside of the shell unless otherwise indicated.
- The interior surfaces of the tank shall be cleaned of all mill scale, cuttings, weld spatter and other foreign matter and shall receive a commercial sandblast in accordance with SSPC-SP 5.

- The exterior surfaces of all tank and piping shall be given a protective coating of the epoxy-phenolic-amine type.

- All interconnecting steel pipes shall be seamless in accordance with ASTM-A 53 or approved equivalent. Pipefittings shall be butt-welded type according with ASTM-A 53. All underground pipe and fittings shall be buried in accordance with ASTM D 1557. The pipe surface shall be given a protective coating of the epoxy-phenolic-amine type.

Fuel Day Tank

The engine generator skid mounted fuel day tank for each D.G. Set shall have capacity to store fuel for 8 hours operation of the set at the rated output. The tank shall have level switch for monitoring low fuel level in the tank. The low level switch shall provide an annunciation and prevent starting of set and to stop the set when the fuel in storage tank is at this level. The tank shall be provided with overflow, vent, supply and discharge valves, inspection cover, drain valve and glass sight gauge.

Generator

Generator shall be synchronous. The generator shall be capable of carrying continuously for 1 hour in every 12 hours, overload equal to 10% of rated output with field set for normal rated load excitation.

Excitation

Excitation shall be from brushless rotating diodes mounted on the main shaft for 3-phase full wave rectification.

Windings

Alternator windings shall have Class-F insulation and shall be impregnated for tropical use. The temperature rise of winding under normal operating conditions and at rated load shall not exceed the limits specified for Class-B insulation. Anti-condensate heaters shall be provided for windings. The heaters shall be thermostatically controlled for switching ON after the set has stopped. The thermostat range shall be adjustable and set to prevent overheating of windings. For protection of windings from damage due to overheating, thermistors shall be embedded to stop the set in case the temperature of winding rises above the safe value.

Voltage Regulation

- Voltage regulator shall be solid state with provision for manual setting. Regulator shall be so designed to protect the exciter when the set is running at reduced speed during starting or idling of the prime mover.

- Voltage regulation shall be plus or minus 2.5% from no-load to full load. Transient voltage drop shall be less than 15% at full load and 0.8 power factor. Time required to restore to steady state conditions after transient voltage fluctuation shall not exceed 10 seconds.

Short Circuit Capability

Generator shall be capable of withstanding without injury, a 30 seconds three-phase short circuit at its terminal when operating at rated output and power factor with fixed excitation.

Deviation Factor

The deviation factor of the open-circuit line-to-line terminal voltage shall not exceed 0.1

Control / Instrument Panels

The Control / Instrument Panel for each generator shall be designed for front access, completely assembled, wired and tested. The control panel shall conform to the constructional requirements as stated in these specifications for Switchboards. The panel should be integrated with DCIM of Datacenter and shall comprise but not limited to the following main components.

Generator Panel

This shall incorporate protection and control equipment, measuring instruments, control and instrument transformers, voltage regulator, governor controls, battery charger, indicating lamps, etc.

Circuit Breaker

- The circuit breaker shall be triple pole with adjustable releases for thermal overload, instantaneous over current, under voltage and over voltage protections.

Instruments

- Ammeter with selector switch.
- Voltmeter with selector switch.
- Frequency meter.
- Kilowatt-hour meter.
- Ammeter for battery charging current.
- Kilowatt-meter.
- Local / OFF / Remote Control Switch.

Engine Panel

An instrument panel on the skid shall have calibrated gauges/meters to measure the following:

- Engine speed
- Lube oil pressure
- Lube oil temperature
- Engine water temperature
- Engine running hours

Safety Devices

Following safety devices shall be provided. The audible alarm shall operate on any fault condition and shall be resettable manually and automatically through a timer after 15 minutes whichever is earlier:

A = Alarm SD = Shutdown TD = Adjustable Time Delay

Engine Over speed	A/SD
Low lube oil pressure	A/SD
High water temperature	A/SD
Over voltage	A SD (TD=0-30 Sec)
Under voltage	A
Short circuit and tripping of circuit breaker	A SD (TD=0-1 min.)
Low level in fuel day tank	A SD (TD=0-5 min.)
High level in fuel day tank	A
Charger failure	A
Winding temperature high	A SD (TD=0-2 min.)
Over crank	A SD
Low crankcase oil level	A
High crankcase oil level	A
Charging alternator failure	A

After shut down, the set shall lockout and it shall not be possible to start it unless manually reset after the cause of fault has been removed.

ATS/AMS Panel:

The ATS/ AMF panel shall incorporate automatic changeover system, which shall be designed for the following functions:

- ATS/AMS should be installed with automatic phase reversal protection panel.
- To start the sets immediately when the main supply fails.
- To start the set and synchronize whenever the main supply voltage drops to 360 volts or rise to 440 volts. The setting voltages shall be adjustable within - 5% and +5% respectively for the lower and upper ranges.

- To make two successive attempts, in case the set fails to start in the first attempt.
- Initiate the Automatic Transfer Switch (ATS) closing the Generator Air Circuit Breaker while the Supply Air Circuit is already made open. The ATS shall transfer the load to the Generators. The system shall provide for immediate transfer of load to the generator, after the rated speed/frequency and voltage have been achieved.
- The load sharing between the two generators based on percentage adjustable load sharing.
- The system shall transfer the load from the generator to main supply wherever the voltage returns +5% and persists for at least 3 minutes.
- The system shall be self-resetting after each cycle of operation.

A four-position selector switch shall be provided for selecting the operation mode i.e. Test-Manual-Automatic-Stop/Maintenance mode to facilitate the operation.

ATS (Auto Transfer Switch Panel):

Separate ATS Panel for each path with IP33 compliant. Panel shall have integral segregation of Form 2 with phase indication lights and digital volt/ampere meter for Genset and IESCO ACB's and MCCB's and all the control equipment including magnetic contactor, relays and timers.

- Structural material should be hot dip galvanized
- Equal rating surge protection device
- Independent bypass panel for each ATS panel having adjustable MCCB's of suitable rating with mechanical interlocking
- Auto load switching between both Genset on each ATS panel
- ATS should be integrated with DCIM

Installation & Testing

- All installation materials for physically installing the Diesel generator set and associated equipment, such as bolts, nuts, washers, supporting steel, etc., shall be provided and installed by the Supplier. The generator shall be installed upright and in level and shall be firmly and rigidly bolted to the steel frame skid with vibration isolators.
- The Diesel generator set shall be completely erected as per manufacturer's instructions and all civil work required for the installation should be according to the manufacturer's specification. Loose parts dispatched by the manufacturer shall be installed and connected as per assembly drawing provided by the manufacturer. Any safety locking of meter, relays, etc., provided by the manufacturer for safe transport shall be released only after the generator/ control panel is erected in position.
- The incoming and outgoing cables shall be connected as recommended by cable manufacturer. The cable armor shall be connected effectively to ground.
- The Diesel generator and associated equipment body shall be connected to earth as per instructions given in section "Grounding" of these Specifications. The Diesel generator set shall be tested as per the instructions of Engineer and commissioned in the presence of PURCHASER.
- The load testing to prove the Prime Rating of the D.G Set should be as following sequence; commissioning Test:
    - 25% of full load 2 hrs.
    - 50% of full load 5 hrs.

- 75% of full load 8 hrs.
- 100% of full load 8 hrs.
- 110% of full load 1 hr.

- The tank shall be installed in accordance with best engineering practice/international codes, the approved shop drawings, applicable code requirements and manufacturer's instructions.
- The piping shall be hydrostatically shop tested as required by ASME code, section VIII, DIV-I and will be dried immediately after the test.

68.LT Distribution Boards

Scope of Work

The work under this section consists of supplying, installing, testing, and commissioning of all material and services of the complete Low Tension (LT) Distribution Boards.

General

The Low Tension Distribution Board (DB) shall be sheet steel fabricated suitable for surface/recessed mounting on wall or floor standing totally enclosed, dust tight and vermin proof. It shall be complete in all respect with material and accessories, factory assembled, tested and finished according to the Specifications and to the normal requirements. The LT Distribution Board shall have protection class IP-42 for indoor installation, class IP-54 for indoor damp areas and class IP-65 for outdoor area.

The Low Tension Distribution Board shall be front operation type and shall:

- Have a rated service short circuit breaking capacity (Ics), conforming to IEC 60947-2 and provided with adequate clearance from live parts so that the flashovers cannot be caused by switching, vermin, pests etc.
- Suitable for 400 Volts, 3 phase 4 wire, 50 Hz system.
- Designed for flush mounting of all instruments on the front side.
- Have incoming and outgoing cable termination arrangement, terminal block/line up terminals.
- Provided with stainless steel name plate on the front side of door.
- Have all incoming and outgoing connections from top or bottom as per requirement of site conditions.
- Have door grounded by flexible copper strip/cable.
- have wiring diagram in the pocket inside the door of Distribution Board

Applicable Standards/Codes

The latest editions of the following standards and codes shall be applicable for the materials specified within the scope for this section:

IEC 60051	-	Direct setting electrical measuring instruments
IEC 60073	-	Colors for indicator lights and push buttons
IEC 60947-2	-	Low voltage switchgear and control gear
IEC 60439	-	Low Voltage Switchgear and Control gear Assemblies.
BS 4752	-	Circuit Breaker

BS 3871 - Miniature & Molded Case Circuit Breakers

BS 88 - HRC fuses

BS 89/90 - Ammeters and Voltmeters

BS 3938 - Low voltage current transformers

BS 1432 - Bus Bars

Sheet Metal Work

- The Low Tension Distribution Board (DB) shall be fabricated with 16 SWG sheet steel recess / surface mounting as approved by PURCHASER. All the components shall be installed on a common component mounting plate inside the enclosure and protected from the front with screwed sheet steel front plate. The enclosure shall be provided with rubber gasketting and a lockable hinged door with cam fastener.
- The distribution board shall be supplied complete with all installation materials as recommended by the manufacturer. The incoming and outgoing cable connections shall be according to the wiring requirements. If required, an adapter box for accommodating the cables and conduits may be provided. The box shall be of the same material and finish as the DB. All holes, cutout etc. shall be tool and free from burrs and rough edges.
- The cabling inside the DB shall be suitably harnessed by means of straps or cords. Color sleeves shall be provided on each cable lugs connected to the bus bars, circuit breakers or terminals for phase identification. An earth bar shall be provided for connection of incoming and outgoing earth conductors. The earth bar shall be permanently connected to the body of DB at two points. Flexible copper strip shall be provided for Grounding of the door of DB.
- Circuit numbers/ designation on all circuits shall be conspicuously marked to facilitate connection and maintenance.
- All metal work of the DB shall be cleaned down to bare shining metal phosphated and the surfaces chemically prepared for powder coating. Then these shall be coated with powder of color RAL 7032 and then baked in oven. The thickness of powder coating shall not be less than 120 microns.

Components

The Low Tension Distribution Boards (DB) shall be provided with components as specified, as shown on the Bidding Drawings and required for the satisfactory operation of the distribution board and of the electrical system.

Typical component specifications are given below:

Bus Bars

- The Bus bars shall be made of 99.99% pure high conductivity electrolytic tinned copper and shall be completely isolated and mechanically braced for the specified fault level. The identification of bus bars shall be by providing colors sleeves on bus bar ends and these shall be red, yellow and blue for phases and black for neutral. The earth bus bar shall be green.

- The bus bars shall be for three phase, neutral and earth and shall be of appropriate size to meet the electrical and mechanical requirements of the system. The temperature rise shall not exceed 30oC at rated current.

Molded Case Circuit Breaker (MCCB)

- The MCCBs shall be molded case triple pole 440 Volts or single/double pole 250 Volts of current ratings. These shall have fixed magnetic short circuit and adjustable/fixed thermal overload protection.
- Under voltage and shunt trip etc. shall also be provided when so required for safe operation and interlock.
- The MCCBs shall be installed such that their switching levers are accessible through the front plate for operation.
- The single and triple pole MCCBs shall have short circuit rupturing capacity suitable for the distribution system as approved by PURCHASER. The MCCBs shall be suitable for working on lighting and power circuits.

ACB's

- Air circuit breaker is to prevent re-establishment of arcing after current zero where the contact gap will withstand the system recovery voltage.
- During interruption of arc, it should create an arc voltage instead of supply voltage. Arc voltage is defined as the minimum voltage required for maintaining arc.
- The microprocessor based Relay shall be capable of withstanding short circuit equal to seventeen times the rated thermal current
- The microprocessor based Relay incomer ACB should have built in single phasing protection and phase unbalance protection as per IEC947-4.
- The ACB's shall be Three-position draw out type. Any attempt to with draw the Air Circuit Breaker, which the unit is in service, will automatically trip the breaker. It shall be possible to rack the ACB main contacts in to disconnected position with the door closed.
- Remote electrical indication of the circuit breaker status should be possible for all the positions.
- The ACB shall have Minimum Service Breaking Capacity (Ics) equal to Ultimate Breaking Capacity (Icu).
- Trip history feature shall be available.

Ammeters and Voltmeters

All meters shall be flush mounting, moving iron, spring controlled. The front dimensions shall be 96 x 96 mm for meters.

The meters shall be of accuracy class 1.5 according to BS-89 and 90. The ammeter shall be suitable for connection to 5 Amps secondary of current transformers or directly through shunt as shown on drawings. The ammeters and voltmeters shall have measuring range as indicated on the drawings.

Current Transformers

Air cooled, ring type current transformers shall be provided having transformation ratio as indicated on the drawings. The current transformers shall be of suitable burden having accuracy class 1.0 according to BS 3938. The current transformers shall have 5 amps secondary.

Selector Switches

The ammeter and voltmeter selector switches shall be complete with front plate, grip handle, R-Y-B and OFF position for ammeters and RY-YB-BR-RN-YN-BN and OFF position for voltmeters shall be marked on the respective selector switches.

Air Break Contactors

The contactors shall be air break, triple pole 400 VAC type and suitable for the type of duty (at least utilization Category AC3) to be performed. The main contacts shall be silver tipped, butt type with double break per pole. Each contactor shall be provided with single phase 230 VAC operating coil and minimum one spare normally open and one normally closed auxiliary contact. The number of working auxiliary contacts shall be provided according to the system requirements.

Push Buttons

The push buttons shall be illuminated, momentary make/break contact type or latch type (push-on/push-off) as required and approved by PURCHASER and suitable for flush mounting. The push button for ON and OFF switching shall be red and green respectively. They shall be provided as shown on the drawing.

Indicating Lamps

Indicating lamps shall be LED type suitable for flush mounting, complete with base. They shall be suitable for operation on 230 V AC and it shall have rosettes of suitable colors as approved by PURCHASER. These shall be provided for R, Y, B phases on each distribution board.

Impulse Relay

Impulse Relay shall be 1 or 2 pole, 250 V rated and be provided with latching mechanism.

Line up Terminals

Line up terminals wherever provided for control or power circuits shall be suitable for voltage and size of conductors as indicated on drawing.

The line-up terminals for controls shall be suitable for channel mounting. All necessary accessories such as end plates, fixing clips, transparent label holder caps and label sheets with marking shall be provided.

Power Factor Improvement

Provision of indoor type Automatic Power factor Improvement Panel to be installed adjacent to Main Panel distribution panel consisting of capacitors make, suitable for 440 Volts, HRC fuses, bases and links, 12 steps automatic reactive relay digital type, “ON” indication lights, power factor meter, push buttons, auxiliary contactors, Hand - Off - Auto switch, discharging chokes, all other necessary materials

Installation

The location of low tension distribution boards (DB) are shown diagramatically on the drawings. The actual location shall be determined at site, keeping in view the site conditions and in co-ordination with other equipment, as approved by PURCHASER.

Low tension distribution board for recessed mounting in wall shall be installed such that the door shall finish flush with the surface of wall. The recess mounted distribution board shall be installed before the plastering of walls. The DB shall be protected to avoid any damage due to the civil work.

Any cuttings, dismantling of the existing wall required for fixing the DB shall be coordinated at site with the approval of Engineer. Any damage done to civil structure shall be made good by the Supplier.

All loose parts dispatched separately with the DB shall be installed as per manufacturer instructions and all adjustments or setting shall be made as required. All screws, nuts and bolts used for fixing the distribution board shall be galvanized.

The distribution board's installation shall include connecting all incoming and outgoing cables. The cable entry in the boards shall be provided from top or bottom as required and/or as approved by PURCHASER.

Note:

a) For ATS Panels ACB rating = 1250A F.P (Draw out type).
b) For Data Centre Main UPS the MCCB rating = 400 A F.P.
c) For Facility UPS the MCCB rating = 200A F.P.
d) For Air-Conditioning Loads the MCCB rating = 400A F.P.
e) For Facility load (Non UPS) MCCB = 75A F.P

All the LT Panels and Switchboards shall be Type Tested.

69. Bus Way Trunking distribution

Installation, testing and commissioning of triple pole + neutral insulated busway trunking distribution as per approved SLD, made of electrolytic copper 99.9%, housed in aluminum casing which act as an earth having louvers at sides, wire mesh, all other accessories required like tees, bends, right angle bends. ASTA and KEMA accredited laboratories to ensure the products supplied meet the international requirement

Ingress protection ratings should available IP55 for Indoor and IP68 CAST Resin for outdoor. Configuration shall be TP/N as 100% Phase and 100% Neutral.

Manufactured in accordance with IEC61439-1 and IEC61439-6. Type Tests 10.2.2 Resistance to Corrosion, 10.2.3.2 Resistance to Abnormal Heat and Fire Due to Internal Electric Effects, 10.2.4 Resistance to Ultraviolet (UV) Radiation.

Seismic Compliance shall have a qualification level - high (Zone-4&5) in accordance to IEEE standard 693-2005.60068-2-3 (Damp Heat Cyclic) and UL Classified E+I Engineering completed extensive testing at UL accredited laboratories to ensure the products supplied meet UL requirements.

The Bidder shall measure the BTD's actual length at the site before its fabrication. The BTD should be installed on the Low-Tension (L.T) side of the Transformer, Gensets, Main Distribution Panel, and Precision Cooling Units.

- In this project the BTD will be used between the transformer LT side up to the LT panels, generators and LT panels.
- The transformers and the D.G Sets are placed on ground floor over the roof of upper basement.
- The LT panels will be installed at first floor. The Supplier is required to Install the BTD at the outdoor and bring it up to the LT panels installed at first floor.
- All the necessary components such as through joints bends and tap off boxes to be installed at site according to the site condition.

- The Supplier will provide the protective weather proof enclosure for the BTD installed at the outside the building.
- The conductor of the bus bars is tin coated Aluminum / Copper.

Testing:
To confirm the integrity of the insulation system, each component of the BTD shall be tested. This test shall be performed at two times rated voltage plus 1000 Vac (2200 Vac).
Every length and fitting of busway must also pass a 7500 Vdc hi-pot test before shipment from the factory.
Every length and fitting of our busway must also pass a 7500 Vdc hi-pot test before shipment from the factory. This additional test helps ensure the highest quality busway possible

70. Low Tension Cables and Wires

Supply installation testing and commissioning of LT Cables and wires as per the size the requirements as mentioned in the drawings.
The general specifications are as under;
General
All multi-core and single core PVC insulated and sheathed cables for light circuits, socket outlets and circuits operating up to 250 volts shall be 300/500 volts grade. All single core PVC insulated, non-sheathed cables shall be of 450/750-volt grade. Power cables for main feeders, main to sub main feeders, power equipment, etc., armored or unarmored shall be of 600/1000 volt grade. Armoring of multi-core/ single core cables shall be done with appropriate size galvanized steel/aluminum wire as per relevant codes.

Applicable Standards/Codes

The latest editions of the following standards and codes shall be applicable for the materials specified within the scope of this section:

- BS 6004 - Electric cables PVC insulated, non-armored cables for voltages upto and including 450/750 volts for electric power, lighting and internal wiring
- BS 6346 - Electric cables PVC insulated, armored cables for voltages of 600/1000 V and 1900/3300 V
- BS 6746 - PVC insulation for electrical cables
- BS 6360 - Copper conductors
- BS 6500 - Insulated flexible cords
- BS 7846 - Electric cables 600/1000 V armored fire resistant cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire
- BS 7889 - Electric cables. Thermosetting insulated, unarmored cables for a voltage of 600/1000 V
- BS EN 50266 - Common test method for cables under fire conditions.

71. EPO (Emergency Power off)

- Emergency Power-Off (EPO) System consists of one or more wall-mounted push-button EPO boxes.
- EPO should be able to disconnect UPS batteries also.
- Each EPO box should provide a single point of equipment shutdown for minimum 6 devices including third party device.
- EPO box can be cascaded with other EPO boxes to support multiple points of equipment shutdown

72. Grounding / Earthing

Supply installation testing and commissioning of earthling with following specification

- The Grounding system consists of earth electrodes, Grounding leads, earth connecting points, earth continuity conductors and all accessories necessary for the satisfactory operation of the associated electrical system.

Applicable Standards / Codes

The latest editions of following standards / codes shall be applicable for the materials specified within the scope of this section:

- BS 7430 - Code of practice for Grounding
- BS 951 - Electrical Grounding. Clamps for Grounding and bonding specifications
- BS 6346 - PVC insulated cables

- Drilling of earth bore 3" (75mm) dia 80 to 90 ft. deep or up to permanent water table, back filling, ramming, complete in all respect. Grounding bores shall be made at 10ft. away from foundation and distance between earth bore shall not be less than 10ft.
- Earth Electrode for Grounding shall comprise of 75 mm x 6 mm thick copper plate with 4 Nos of 6 mm dia brass nuts, bolts and washers 70 sq. mm. HDHC Copper wire as Grounding leads. A 100 mm dia Medium Duty GI pipe shall be used with 10 mm dia hole.
- When the drilling is complete, the above mentioned earth electrode shall be drop down to the bottom of the hole with the help of 70 sq. mm. earth leads.
- Once the plate is in place fill in the hole with moisture retaining bentonite slurry with tremie method up to the top. When the bentonite settle down cast a (1:4:8) concrete manhole 700 mm x 700 mm & 500 mm deep.
- The required earth resistance is less than 1 Ohm. If 80 to 90 feet drilling does not meet the specified earth resistance requirement then the Supplier should increase the drilling depth as needed to achieve the specified earth resistance.

(ix) Grounding Material

- **Grounding Lead**
- The Grounding lead shall connect the earth electrode to earth connecting point or equipment in the building. It shall be of stranded electrolytic copper. It can be bare or PVC insulated of size shown on the drawings.
- **Earth Continuity Conductor**

- Earth continuity conductor (ECC) shall be stranded bare copper wire or single core PVC insulated copper conductor cable of sizes indicated on the drawings. All thimbles, lugs, sockets, nuts, washers & other accessories necessary for the complete installation of ECC shall be provided by the Supplier without any extra cost.
- The specifications for single core PVC insulated cables used as ECC shall be same as those given in section "LT Cables" of the technical specifications. PVC insulated cables when used as ECC shall be green or green/yellow.
- **Earth Connecting Point**
- Earth connecting points shall comprise tinned copper bar, rectangular in shape, having dimensions of 300 x 50 x 6 mm. At least six terminals for connection shall be arranged on the bar, which can be increased or decreased as required by PURCHASER.
- The terminals shall have brass or tinned copper bolts, nuts and washers for protection against corrosion. Two holes shall be provided off center of the copper bar for fixing to the wall by means of 10 mm dia. nut and bolt and shall be insulated by means of rubber gaskets/washers.

73. Lightning Arrestor

Active capturing system: Product should be designed to function in accordance with the principle of "Early Streamer Emission (ESE)"

- Any European/US Brand
- 100% of efficacy in discharge capture.
- High level of protection.
- Lightning rod without electrical components.
- Maximum accepted current 200kA.
- Should preserves its initial properties after each discharge.
- Doesn't have replaceable parts
- Doesn't require external power supply.
- Operation guaranteed in any atmospheric condition.
- High resistance to temperature upto: 125ºC.
- High resistance to weather conditions and corrosive atmospheres.
- Maintenance free
- Should be provided with lightning strike counter
- Compliance with NF C 17-102, UNE 21186:2011, IEC 62305 or similar

74. HVAC

75. Scope of Work

This section forms an integral part of each section of HVAC system.

The scope of work covered in this section encompasses the provision of all materials, equipment, and the execution of all tasks required for the comprehensive implementation and finalization, which includes testing and commissioning of all HVAC systems as outlined in the specifications or as directed by PURCHASER.

This encompasses all systems, including the integration of internal systems with external ones. All materials and equipment used must adhere to the specified specifications and should be limited to products regularly manufactured and recommended by the manufacturers for their intended use. Prior to installation, the Supplier is required to submit samples, necessary catalogs, sketches, the manufacturer's information, and any necessary guarantees for approval by PURCHASER. All materials and equipment must be new and unused.

Furthermore, all other equipment and materials should be installed in strict accordance with the manufacturer's instructions, which are considered an integral part of the specifications.

It is explicitly understood and agreed upon by the Supplier that any material or labor typically provided as part of such equipment, and necessary for its proper completion and optimal functioning, will be included as part of this contract at no additional cost, whether or not detailed on the drawings or explicitly described in the specifications.

The Supplier bears responsibility for their work until its completion and final acceptance, and they are obliged to replace any damaged, lost, or stolen components without any additional cost to PURCHASER

All openings left in floor for passage of ducts, pipes and cables etc. shall be covered and protected.

Each exposed end of the pipes should be securely sealed to prevent any foreign matter from entering the pipe during the installation process

The arrangement, positions and connections of pipe fittings and appurtenances shall be but PURCHASER reserves the rights to change the locations. Special precautions shall be taken for the installation of concealed pipes and/or as required. Should it be necessary to correct piping so installed, the Supplier shall be held liable for any injury caused to other work in the correction of piping. For any expedient change, the Supplier will correctly show it in shop drawings. A minimum distance between different services shall be maintained as shown in the contract documents or as approved by PURCHASER.

All exterior openings provided for the passage of piping and ducting shall be properly sealed with snugly fittings collars of metal of other approved rat-proof material securely fastened in to place.

Joints at the roof, around ducts and pipes, shall be made water-tight by the use of lead, copper, galvanized iron or other approved flashings of flashing material. Exterior wall openings shall be made water-tight.

Piping in floor shall be laid on a firm bed for its entire length. Piping shall be installed without undue strains and stresses. Vertical piping shall be securely held to keep the pipe in alignment and carry the weight of the pipe and contents. Horizontal piping shall be supported to keep it in alignment and prevent sagging. Hangers and anchors shall be of metal of sufficient strength to maintain their proportional share of pipe alignments and prevent ratting. Hangers and anchors shall be securely attached to the building construction.

These specifications are supplementary to the requirements above. All required approvals of shop drawings and materials shall be obtained by the Supplier from the appropriate authorities before proceeding with work on site. All connections to/from city points of utilities supply/discharge shall be the Supplier’s responsibility.

76. Specifications:

VRF Outdoor Condensing Unit 150 - 170 kW Nominal Cooling Capacity (Heat & Cool)

- Operation Range (Cooling): -15°C ~ 55°C
- Operation Range (Heating): -30°C ~ 24°C
- Compressor Type: Inverter Scroll
- Refrigerant Type: R-410
- Power Supply(V/Ph/Hz): 380~415v/3N/50Hz
- Sound Pressure Level(dB): 60
- Power Supply(V/Ph/Hz): 220-240V ~ 50 Hz
- Indoor Unit Type: 360 Air Discharge Cassette
- Air Flow Volume: 3 Speed
- Sound Pressure Level(dB): 40
- Drain Pipe Dia(mm): 25

The system must be a VRF all DC Inverter system and should incorporate the following features

- All compressors should be DC Inverter type compressors controlling the cooling and heating capacity automatically according to the load.
- Only a DC inverter compressor shall be used in this system and it can directly intake gas to reduce loss of overheating and improve efficiency.
- Compressors should be in redundant configuration.
- Five (05) years with consumables with filters.
- Compressors shall have DC Speed speed-varying technology to satisfy various places demands at different temperatures and shall be able to save a great deal of electricity and provide users with the utmost comfort at the same time.
- The condenser fan motors shall be DC Inverter type and shall have Step-less speed regulation ranges from 5Hz to 65Hz. Compared with traditional inverter motors, it is more efficient. It shall have Sensor less control technology to guarantee lower noise, less vibration and steadier operation.
- In auto energy saving mode, the system shall be able to self-adjust parameters according to the operation status, thus lowering the cost of electricity with up to 15% of energy saving. In compulsory energy saving mode, the system shall limit power output forcibly with up to 20% of energy saving.
- The system shall be able to remember the highest temperature outdoors. When night comes, the system shall automatically turn to quiet mode.
- There shall be an option for Quiet modes which can be set according to actual needs.
- The unit casing shall be manufactured from a minimum (90-100u) polyester powder-coated baked enamel finish sheet steel in order to have high corrosion resistance and to protect salt salt-laden environment close to where the units may be installed.
- The air outlet grilles shall have plastic-coated guards. Units access panels shall be removable with minimal screws and shall provide full access to the compressor, fan and control components, and the fan must be an inverter-driven variable speed propeller type fan.
- Outdoor fans shall be direct-drive propeller type, and shall discharge air vertically, fans shall draw air through the outdoor coil.
- Outdoor fan motor shall be totally enclosed, inverter driven with permanently lubricated ball bearings. The motor shall be protected by internal thermal overload protection.
- The indoor units of VRF all DC inverter systems shall have DC Inverter motors to realize step-less regulation. According to indoor temperature or people’s actual needs, users shall set this mode through the indoor wire control.
- The system shall have its working voltage range from 320V-460V and in the places with unsteady voltage; this system shall be able to run satisfactorily.
- The system operating range in cooling mode shall be from -5° C to 52° C.
- The system operating range in heating mode shall be from -30° C to 24° C.
- The cooling or heating mode shall have option to be deactivated during a certain season to avoid the mode conflict in case of miss operation.

- The outdoor unit shall be able to be linked with a fire alarm signal. In case of emergency, unit shall automatically turn off to avoid risk or further loss.
- The outdoor unit shall be able to receive a power signal of electricity shortage. VRF system should be capable of receiving signal from the generator for load management.
- When a certain indoor unit needs to be repaired, it shall be powered off without any interruption to the system's operation.
- First-grade oil separator shall have a filtered expansion valve with a 98% of separation efficiency; Second-grade oil separation will separate the remained 2% refrigerant oil with 95% of separation efficiency. General Efficiency shall be 99.9%.
- The outdoor unit compressor shall be provided with self-balancing control and there shall be no need of external oil balancing line. By collecting and calculating the capacity output and threshold of each module, the distribution of refrigerating oil shall be automatically controlled to ensure stable operation of the system.
- The operating priority sequence of the outdoor unit modules shall be fully automated according to the parameters of compressor reliability (suction and discharge pressure, temperature, operating current, protection), and in combination with historical data correlation analysis, it can intelligently balance the running time and load, achieve variable cycle module rotation control, and extend system's service life.
- Each module shall be of an independent sub-system, and the whole system won't fail down even if partial malfunction occurs. Upon malfunction of any one of the modules, there shall be option of emergency operation after simply manual setup on the outdoor PCB switches.
- Refrigerant shall be taken into a compressor by an intake pipe and then runs through the cooling system. It shall control oil level and the minimum oil each compressor needs and therefore realize oil balance.
- Dual electronic expansion valve with its 2400-step grades of regulation shall precisely regulate refrigerant's flow between outdoor unit and indoor unit.
- The VRF all DC inverter system shall realize a combination of 4 outdoor unit modules (maximum). When error is occurred to one of the modules, the others shall perform the emergency operation to sustain the air conditioning. All the compressors in each single module shall be DC Inverter based, when one compressor has error, others shall perform the emergency operation. Double-fan design shall ensure that one fan can still work even if the other one has error.
- The VRF all DC inverter system shall realize a combination of 4 models (maximum) and connect as many as 100 indoor units. The cooling capacity of the outdoor units should adjust automatically, according to the number of operating indoor unit(s).
- The maximum total pipe length of single outdoor unit's circuit shall have 1000 m.
- The maximum actual pipe length between indoor unit and outdoor unit shall have 200 m.
- The maximum height difference between indoor unit and outdoor unit should shall have 110 m.
- The maximum distance between the first branches to the farthest indoor unit shall have 40 m and may be extendable in special cases.

- The system should offer 2HP increments of capacity range, which should meet customer needs accurately and the maximum capacity combination should be up to 96HP.
- The system should have an inner-screw copper heat-exchanger, which can create higher heat exchange efficiency and powerful heating capacity especially in low ambient temperature. Outdoor heat-exchange area should be adjusted by running load. The system should have dual EXV, which should achieve up to 2400 steps refrigerant adjusting precision to ensure precise control of refrigerant and raise system circulation efficiency.
- The combination of one main and one auxiliary four-way valve should control the outdoor heat exchanger and outdoor air flow independently and according to the load, adjust the heat exchange volume of outdoor unit accurately and prevent wasting the capacity in part load time. Main 4-way valve should be used as the traditional 4-way valve, while the auxiliary 4-way valve should be used to adjust the heat-exchanger area of outdoor unit when in cooling mode.
- The outdoor unit shall have optional heat storage device for fast defrosting. (If required)
- The outdoor unit's condenser fans shall have external static pressure of 110 Pa in case of outdoor units' placement inside the building.
- The compressor shall be provided with an integrated sound absorber and shall be enclosed inside metal sound proof box to minimize the noise.
- The outdoor unit shall be equipped with sudden high voltage shock prevention technology so that the internal components may not damage. Lightning protection shall also be provided.
- The unit shall be equipped with anti-wind function as before the unit starts up, if the fan moves backward because of the wind, the energy braking control may stop the fan and then start up the unit according to normal procedure.
- The outdoor unit shall be equipped with dust removal function.
- VRF condensing units shall be provided refrigerant cooled PCB boards.

(x) Controls system for VRF All DC Inverter system:

- The system should have Individual control, group control, network control options.
- The system should have network control system that can realize intelligent management to the A/C system.
- The remote monitoring of the system shall be possible through DCIM

The system shall have auto debugging features like:

- The system shall be debugged by one-button debugging option or with laptop and pad-based option for quick commissioning.
- Automatically allocate ODU and IDU addresses
- Automatically calculate numbers of ODU and IDU
- Automatically detects errors;
- Automatically starts debugging.
- VRF Central Controller shall adopt CAN based communication technology.

(xi) Air Cooled Condensing Units (CU-Units)

The condensing unit shall be of the vertical discharge, air cooled type, suitable for outdoor installation and sized to deliver the required capacity matched to relevant indoor units at specified ambient temperature. The condensing unit shall be of same manufacturer as that of Indoor A.C. Unit.

The condensing units shall be air-cooled type incorporating heat exchanger coils manufactured from copper tube copper fins or Aluminum Manganese anti rust alloy which should be coated with Golden Protection Layer (Components: Epoxy Resin & Modified Acrylic, Silicon free), the anti-corrosive performance in salt-spray testing must be at-least 200% higher than normal blue/golden fins, factory treated to reduce the effect of atmospheric corrosion. The color shall be manufacturer's standard. The air outlet grilles shall have plastic coated guards.

All outdoor units are to be permanently marked with an identification number. The removable access panels are also to be marked with the same number.

The outdoor units are to be Variable Refrigerant Flow (VRF) based centralized combination of multiple outdoor units of capacities given in schedules.

The outdoor units shall have all DC inverter compressors electronically controlled and capable of varying refrigerant flow with variation in cooling/heating requirements.

The capacity control of the outdoor units will be digitally controlled and shall be determined electronically by sensing operational temperatures, pressures, and ambient temperature etc.

The access to the internal components for maintenance purposes shall be by removable panels.

It shall be possible to connect up to 100 indoor units, capacity permitting, to one modular outdoor unit.

The outdoor unit shall have full capacity control to meet the load fluctuation up to 135%.

(xii) Indoor Units

Direct Expansion Type Air conditioning units each carrying its own thermo-static expansion valve, shall be ceiling recessed (Cassette type) reversible, (Heat pump) type or ceiling concealed ducted type or Decorative Wall Mounted. All necessary components/parts shall be selected manufactured and assembled by the same manufacturer as for outdoor condensing units with Scroll Compressors.

The Indoor units shall include following items:

- DX.- Type coil
- Washable filters
- Supply air fan with Step less DC Inverter motor
- Automatic air swing facility. (Wherever required with the unit)
- Drain arrangement.

The following type of indoor units may be used for this type of system.

(xiii) Four-way discharge cassette

The unit casing shall be manufactured from galvanized steel plate and shall be fully insulated.

Facility shall be provided for duct connection for the introduction of fresh air in the unit.

The fan shall be of propeller type, statically and dynamically balanced to ensure low noise and vibration-free operation.

The heat exchanger coils shall be manufactured from copper tubes and aluminum fins. It shall have an electronic expansion valve to control the refrigerant flow rate in response to the load variation in the conditioned space. The expansion valve shall be controlled by an integral computerized control system to maintain the desired room temperature.

The low-profile dedicated decoration panel shall be provided for each unit. The decorative panel shall incorporate the return air grille and supply air louvers. A facility shall be provided to automatically swing the supply air lovers or lock them at a desired angle to ensure even distribution of the airflow.

The low-profile dedicated decoration panel shall have an option of Auto lifting and lowering of grill for better cleaning. A condensate drain pump shall be provided with the unit. The condensate shall be drained from the unit using thermally insulated u PVC piping and run directly to the nearest drain piping mains.

The air filters shall be incorporated within the unit and shall be mold resistant washable type.

(xiv) Ceiling concealed Duct type

The unit casing shall be manufactured from galvanized steel plate. Facility shall be provided for duct connection for introduction of fresh air in the unit and branch ductwork from the unit. The return air to the unit shall be through the bottom/back of the unit as per manufacturer's standard.

The heat exchanger coils shall be manufactured from copper tubes and aluminum fins. It shall have electronic expansion valve to control refrigerant flow rate in response to the load variation in the conditioned space. The expansion valve shall be controlled by an integral computerized control system to maintain the desired room temperature.

The condensate shall be drained from the unit using thermally insulated u PVC piping and run directly to the nearest drain piping mains.

(xv) Wall mounted type

The unit casing shall be manufactured from heat resistant plastic. The casing color shall be manufacturer's standard. The fan shall be cross -flow centrifugal type, statically and dynamically balanced to ensure low noise and vibration free operation.

The heat exchanger coils shall be manufactured from copper tubes and aluminum fins. It shall have electronic expansion valve to control refrigerant flow rate in response to the load variation in the conditioned space. The expansion valve shall be controlled by an integral computerized control system to maintain the desired room temperature.

The condensate shall be drained from the unit using thermally insulated u PVC piping and run directly to the nearest drain piping mains.

The bidder must provide documented evidence of all the technical parameters mentioned above in catalogue or from the manufacturer.

(xvi) Drawings, Changes & Installation

The drawings shall be considered to show the general character and scope of the work and not the exact details of the installation. The installation shall be complete with all accessories required for a complete and operative installation.

The location, arrangement and connection of equipment and material represent a close approximation to the intent and requirements of the Contract. The right is reserved by PURCHASER to make reasonable changes required to accommodate conditions arising during the progress of the work, at no extra cost to the Contract.

All piping and duct work in finished areas shall be concealed in ceiling spaces and shafts or chased into walls. No exposed piping or duct work shall be installed in such areas unless specifically accepted by PURCHASER.

Any pipe or mechanical equipment mounted on roof, or housing for such equipment, shall not be closer to the edge of roof than a distance equal to the height of the pipe, hood or equipment; unless specifically accepted by PURCHASER.

The actual location of sensing devices, thermostats, switches, etc., shall be reviewed by PURCHASER before installation.

The location and size of existing services shown on the drawings are based on the best available information. The actual location of existing services shall be verified in the field before work is commenced.

Changes and modifications necessary to ensure coordination and to avoid interference and conflicts with other trades, or to accommodate existing conditions, shall be made at no extra cost to the Contract.

The Supplier shall ensure that all plant to be supplied by him can be installed in the available space and that there is adequate access to admit all plant to its position and enable maintenance to be carried out on the plant without difficulty.

Special care shall be taken in areas where pour-gaps take place. Coordinate the work schedule with the Supplier.

(xvii) Examination of Site

Before responding to this tenders each bidder shall examine the site to determine the conditions which may affect the proposed work. No claims for extra payment will be considered, because of failure to fulfill this condition.

77. Suppliers Technical Responsibilities

(xviii) Concrete Foundation

The concrete foundations for supporting equipment, such as floor-mounted condensers, should extend 6 inches beyond the outer edges of the equipment, unless otherwise specified. These foundations are to be cast within forms constructed using new, planed 6-inch nominal lumber. To ensure neatness, all corners of the foundations should be chamfered using either sheet metal or triangular wood strips securely attached to the forms.

Foundation bolts are to be embedded in the forms during the concrete pouring process, and their precise positioning should be facilitated with the use of templates. Each bolt should be placed within a sleeve that provides a half-inch clearance around the bolt. Additionally, it's important to allow for 1 inch below the equipment bases for alignment and grouting.

After the grouting process is completed, foundations for equipment situated on the building's exterior should be constructed in accordance with the specifications detailed in the Shop Drawings submitted by the Supplier for review by the Architect/Engineer

(xix) Ceiling Suspended Equipment

All equipment hangers shall have static deflections equal to or larger than 25mm.

(xx) Vibration Isolators

All steel spring isolators should include a neoprene pad at least 10mm thick mounted next to and in series with the spring. Seismic restraints should be employed in all steel spring isolators to limit movement of the equipment in the vertical and horizontal directions.

All rubber isolators should be double acting with no through-bolted connections. There shall be at least a 50mm air space between the bottom of the isolated equipment and the floor slab.

(xxi) Painting for Piping and Equipment

The Supplier shall paint all equipment, ducting, piping, hangers, bracing and other surfaces exposed to air as specified and he shall also be responsible for all finish painting.

Material for painting shall be high grade products of well-known manufacturers and when approved shall be delivered on the site in original unbroken packages bearing the maker’s name and brand.

Piping shall be insulated

Each pipe shall be insulated separately with pre molded pipe insulation and gaps, if any, shall be filled with the same insulation material. All circumferential and longitudinal joints shall be sealed with at least 50mm wide self-adhesive tape of approved quality.

(xxii) Refrigerant Pipe

Refrigerant pipes shall be Copper pipes shall be installed strictly in accordance with manufacturer recommendations.

(xxiii) Test Run

The Supplier shall be required to carry out test run(s) as required.

(xxiv) Commissioning, Testing and Adjusting of HVAC

The air conditioning system described in this specification and shown on the drawings shall be commissioned. All commissioning Engineers/specialists shall be qualified to undertake such work and then competence shall be demonstrated to the satisfaction of PURCHASER.

78. Ancillary Work

79. Security & Surveillance System

- Should be an IP based CCTV System.
- CCTV manufacturer should be ISO 9001 Certified, and in large scale CCTV manufacturing business. The proposed Make, Brand should have global and local reference installation in Rated/Tier-III Data centers.

(xxv) Cameras

Fixed HD Bullet IP Camera Wall Mounted

- Megapixel, 1/2.7" Progressive Scan CMOS , Color: 0.001 Lux @ (F1.0, AGC ON) Day/Night Vision, Motion Detection HD Bullet Camera
- Resolution 2688 × 1520, IR Illumination Range: 50m IR Night Vision
- True WDR 120dB, intrusion detection, motion detection, line crossing
- Camera shall have a horizontal and vertical 'Field Of View' wide enough to completely cover all areas
- 128GB local memory for storage

  802.1x authentication

Fixed HD Dome IP Camera Ceiling/Wall Mounted

- Color 4 Megapixel Day/Night Vision, Motion Detection HD Dome Camera
- Resolution 2688 × 1520, IR Illumination Range: 50m IR Night Vision
- True WDR 120dB, intrusion detection, motion detection, line crossing

- Camera shall have a horizontal and vertical ‘Field Of View’ wide enough to completely cover all areas
- 128GB local memory for storage
- 802.1x authentication

Thermal Bullet Camera for Core Components

- Image Sensor Vanadium Oxide Uncooled Focal Plane Arrays
- Thermal Resolution 256 × 192
- Pixel Pitch 12 µm
- Spectral Range 8 µm to 14 µm
- Focal Length 3.6 mm
- Min. Focusing Distance 0.4 m
- Heat detection and alarm, tripwire, intrusion, and target filtering.
- Digital Zoom × 2, × 4
- Optical Module, Image Sensor 1/2.7" Progressive Scan CMOS
- Resolution 2688 × 1520
- WDR 120 dB, Image Effect
- Target Coloration Yes. Supported in white hot and black hot mode.
- 128GB local memory for storage

(xxvi) Network Video Recording Solution

- 128 Channel Network Video Recording solution Rack Mounted with SAN Storage
- Simultaneous view, with 90 days recording 25fps@ full resolution , playback, backup & remote monitoring
- Supports HD recording with cameras up to 5MP
- Video Compression: H.264 / H.265
- Storage Capacity: 90 days
- Copy of all recordings on cloud storage for 15 days with overwriting capability
- HDD with RAID-5
- Automatic backup and storage on backup media
- Network Interface 10/100/1000-Base-TX, RJ-45
- VGA OUT & dual HDMI outputs with output resolution of 4K and 1080p
- Remote access via iOS, Android, PC / Mac
- Integrated with NOC & DOC Room Video Walls
- Behavior analysis features : intrusion, area entry, area exit

(xxvii) Video Management Software

- Designed to meet a variety of security challenges on a single platform
- Manage multiple individual systems, such as video security, access control, security alarms etc.
- Open architecture permits easy integration with third party systems and hardware

(xxviii) Other Hardware & Cabling

- CCTV Management Workstation (Core i7 Slim Branded Desktop PC with Windows 10 Prof 64bit, 16 GB RAM, 2TB HDD & DVD Writer) including monitor, Keyboard & mouse
- 24 Port Managed 10/100/1000 Layer 3 Stackable full POE switch, 2 x10G SFP ports, 100 Gbps forwarding bandwidth, enterprise class security features, SNMP support, Redundant Power Supply, stacking cable
- CAT-6 Structured Cabling for complete CCTV system as per manufacturer recommendation in cable tray/EMT Conduit

80. Access Control System

- Biometric Access Control 4 in 1 Face/ Fingerprint/RFID Card/PIN Recognition, EM Lock (600Lbs), ZL Bracket, Exit Push Button, POWER Supply, installation and integration with DCIM
- "CE/FCC or equivalent certified
- Minimum Users Capacity = 1000"
- Touch Screen size - 4-7 inch
- Electromagnetic Door Lock with Magnetic Contact and matching power supply
- Contactless/Touch-free Exit Button with Beep sound & LED Status Indicator
- Door Panic / Push Bar
- Manual Key Over-Ride
- Door Siren
- Emergency Door Release
- Remote door release switch at reception counter

Access Control and Time Management Server (Hardware + Software) required functionality and Features:

- WEB Portal, Client Server Topology
- Native Access, SQL Express, SQL, MySQL, Oracle
- Export Attendance data
- Unlimited Users, PUSH technology
- Message Broad Cast Facility, Emergency Alarm Action
- System integrated with CCTV

- Provides cardholder management, door force alarm, door too long open alarm, full alarm and event processing, alarms
- Alerting via email
- Detailed audit trail records
- Built-in flexible reports
- System Calendar (for sophisticated scheduling)
- Face template management
- Attendance Management
- Shift Management

Visitor Management System integrated with Main Access Control required functionality and Features:

- Visitor registration
- Web based preregistration by hosts
- Host notification on visitor arrival
- Print professional color visitor passes with expiration date, visit area, host, and purpose of visit
- Visitor sign out and notification to host
- Includes: Front desk workstation, camera, signature pad, business card/ID Card/Driving License scanner, visitor pass printer and software
- Proximity Cards HID credit card standard size and thickness, thin, flexible polyvinyl chloride laminated, passive type, easy printable on both sides
- Access Control manufacturer should be ISO 9001 Certified, and in large scale access control manufacturing business. The proposed Make, Brand should have reference install base in Tier/Rated-III Data Centers in Pakistan.

81. Video Wall Display

Video Displays manufacturer should be ISO 9001 Certified, in large scale screen manufacturing business for at least 10 years, among world renowned leading brands

The proposed Make, Brand of all video displays should be from same manufacturer

The users should have the flexibility to display live overlay windows from HDMI, HDBaseT, SDI input, PC input and network input. These live inputs are displayed in real time and scaled to the desired position and size. These overlay inputs can overlap with the graphics windows and with each other

Video controller can be from same manufacturer or third-party but fully compatible with Video Wall

- Each LED Panel Size: 55 inches Diagonal.
- Industrial grade IPS LCD panel, suitable for continuous 24h/7 operation

- Brightness: 500 cd/m2 or high
- Ultra-narrow 0.9mm bezel-to-bezel design or low · Anti-glare panel, vivid and memorable image quality
- Response Time: 8ms
- Input: Display Port, HDMI 2, DVI-D, Analog, USB, Audio
- Same OEM supplied Pop-up type wall brackets
- Sensor: IR/Ambient

Video Controller should support:

Multi input and Multi output

Both single/split views and multiple inputs from different IT and Facility monitoring systems

82. Cable Tray & Ladder

Locally manufactured NEMA compliant perforated Cable Tray gauge 16SWG with cover, Hot Dip Galvanized, appropriate sizes and lengths of MS Rod / Angle Iron Supports, C-channel and anchor Bolts (HILTI/FISHER), including cutting, welding, jointing and necessary required hardware etc. for installation at ceiling, wall, raise floor or in floor screeding etc. as per Specifications, complete in all respect
Locally manufactured NEMA compliant perforated Cable ladder, Hot Dip Galvanized, appropriate sizes and lengths of MS Rod / Angle Iron Supports, C-channel and anchor Bolts (HILTI/FISHER), including cutting, welding, jointing and necessary required hardware etc. for installation at ceiling, wall, raise floor or in floor screeding etc. as per Specifications, complete in all respect

83. Wiring for lighting & Power Socket

Circuit wiring from DB-LP to Switchboard including wiring between switch on the same circuit with 2x2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable + CPC 2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable in 25mm diameter EMT conduit, surface / recessed in wall, column, etc., including with all conduit accessories, connectors, ceiling rose, flexible wires, sheet steel boxes, tagging etc.
Point wiring for light point from Switch Board to Light Point with 2x2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable + CPC 2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable in 25mm diameter EMT conduit, surface / recessed in wall, column, etc., including with all conduit accessories, connectors, ceiling rose, flexible wires, sheet steel boxes, tagging etc.
Supply & install new lighting point's c/w light switches and using 2 x 1C/1.5mm sq. PVC cable in PVC pipe for Server room, NOC, MM, Lobby and Power rooms

Bidder shall propose any additional wiring as per their proposed electrical design.

83.1.1 Internal, External Lighting & Fixtures

- Supply of following specialized 24x7 type light fixtures complete with LED lamps/panels, compliant to IEC 60598, IEC 62031 or equivalent standard, Electronic Driver including all suspension, rated life 50,000 hours, standard white or day light white 5000k colors, mounting, fixing and hanging materials, brackets, chains, hooks etc. as per Specifications including all accessories, complete in all respect
- Light manufacturer should be ISO 9001 Certified, and in large scale light manufacturing business for at least 20 years
- Installation and fixing of data center special lights LED (min 500 LUX) antiglare size 2 ' x 2' with motion sensor for Server room, 2x MMR, 2x Power rooms, Staging room, 3x Stores
- Pole mounted LED Flood Light, 100W, IP65 including Pole for Generators, Transformer & Roof top

Stand Alone Motion/Occupancy Sensor (IP-40) having following specifications:

- Coverage Range: 360°
- Operating Voltage: 230V AC
- Timing Range: 5 sec to 20 minutes

- Supply, installation and fixing of special lights LED (min 500 LUX) antiglare size according to proposed design
- for, NOC, SOC, Systems team room, Network team room, CISO Room, Chief IT Room, Secretary IT Room, Lobby"
- All concealed outlet boxes for switches, sockets and other receptacles shall be rust proof and shall be smooth external and internal surfaces. All outlet boxes for receiving plug sockets and switches shall be of standard factory make and of approved size, and shape.
- All 5/15 amps switches shall be enclosed type flush mounted for 230 volts AC. The box in which the switches are fixed shall have an adjustable plate cover. Ample space at the back and sides shall be provided for accommodating wires. Switch, controlling the light point shall be connected to the phase wire of the circuit. The Switch plate shall be white plastic or any other approved type and it should match the interior design
- All power sockets shall be of shutter type
- Given the varying usage patterns of data centers throughout the day, it is advisable to implement adaptive lighting solutions that can flexibly accommodate these requirements while promoting energy efficiency. It is suggested to employ a three-tiered lighting protocol
- Level one: The initial lighting tier is optimal for use in an empty data center, where a minimal level of illumination will be maintained to facilitate effective video surveillance and safeguard the facility.
- Level two: The second lighting tier comes into play as soon as staff members enter the data center. This additional lighting also aids security personnel in identifying individuals entering the room.
- Level three: The third lighting level is specifically tailored for equipment maintenance and repair tasks, providing the brightest illumination.
- All the fixtures shall be suitable for single phase, 50Hz, 230 Volts, AC supply system.
- Supply of specialized 24x7 type light fixtures complete with LED lamps/panels, compliant to IEC 60598, IEC 62031 or equivalent standard, Electronic Driver including all suspension, rated life 50,000 hours, standard white or day light white 5000k colors, mounting, fixing and hanging materials, brackets, chains, hooks etc. as per Specifications including all accessories, complete in all respect

84. Emergency/Exit Lighting

Rechargeable NiCad battery-operated (3hrs backup) self-test LED emergency lights, rated life 50,000 hours, compliant to BS5266/IEC598-2 or equivalent standard as per Specifications including all accessories, complete in all respect

85. Structured Cabling

- All cables shall be installed in accordance with latest issue of BS EN50174 and the manufacturer’s instructions and recommendations. Care should be taken to ensure the minimum bend radius is not exceeded thereby preventing kinks in the cable construction. Power and data separation must be adhered

- Fiber items including all accessories, complete in all respect required to establish the fiber network connectivity of new main Data Center with MMRs
- Fiber Patch Panel 48 Port - MMR 1&2
- Fiber Optics Multimode OM-4 LC/LC Patch Cord MMR 1&2 to Server room distribution Racks
- Cat 6/7 UTP patch cord Cable with RJ-45 Connectors (Ready to use) Server room racks
- Cable Management - Complete floor
- 4"x4" Rigid PVC Fiber Raceway and Routing System
- Supply and installation of CAT-6 Network cabling including faceplates and metal back boxes for NOC, SOC, Systems team room, networks team rooms, MMR, Power rooms' Staging area, Lobby, security/reception area and few nodes in Server room and integration of DCIM.
- Structured Cabling manufacturer should be ISO 9001 Certified, and in large scale cable manufacturing business for at least 10 years. The proposed Make, Brand should have reference install base in Tier/Rated-III Data Centers.
- 48 port shutter type Cat-6, RJ 45 UTP Patch Panel fully loaded with tool less jacks and cable manager
- Dual shutter face plates including I/Os for all tables in NOC, SOC, Systems team room, Networks team room, CISO Room, Chief IT Room, Secretary room, conference room and allied facilities

86. Civil & Interior Work

The work will be executed as per following specification:

87. Brick Work:

Alteration and installation of 9” or 4” thick first-class burnt brick walls in washrooms, power rooms, and the meet me room, whether straight or curved. Ensuring proper sealing of existing windows and applying plaster finish where necessary

Providing and laying first class burnt brick, straight or curved 9"& 4” thick wall as required

88. Plaster Work:

Providing and laying 1/2" - 3/4" thick plaster 1:4 on brick walls at any floor, any height, making edges, grooves and corners, including preparation of surface before plastering by rubbing with wire brush and washing with clean water, curing, finishing, scaffolding, lifting, hoisting etc. complete as per design and directed by the site Engineer.

Chicken wire mesh is to be provided at the junction of concrete and masonry work or wherever it is required before plastering work.

88.1.1 Dismantling Work:

- Dismantling current wall paneling, partitions, false ceiling, electrical fixtures, and any surplus items.
- Extracting designated door frames along with their shutters, including fixtures and hardware.
- Eliminating all existing electrical fittings, encompassing wiring, cables, panels, distribution boards.
- Clearing out any other outdated materials or fixtures in the first-floor area that are no longer needed
- Properly disposing of all removed materials as needed while ensuring site cleanliness

88.1.2 Structural Retrofitting:

- Reinforcement for the rear courtyard slab to endure the applied loads and vibrations of Generators
- Reinforcement of the First Floor slab to withstand TIA – 942B Rated -3 standard applied loads and vibration of core components
- The Selected bidder must offer a reinforcement solution that aligns with the details as per Annex …… “Structural Retrofitting” a more advantageous alternative may also be proposed

89. Plumbing work:

Plumbing Fixtures

- Providing and fixing Sanitary ware of Porta/Imported make with all Sanitary fittings of (Faisal, Master, Sonex or equivalent) make including Muslim shower, Double Bib Cock, Towel Rail, Soap dish, Coat Hook & Toilet paper holder etc. complete in all respect or as directed by consultant.

- Providing and fixing CP sink mixer (Faisal, Master, Sonex or equivalent), C.P pipe 15mm dia. complete including pipe connection, all fittings, testing etc.

- Providing and fixing stainless steel rectangular kitchen sink (Faisal, Master, Sonex or equivalent) of size (30"x18"x8") fixed in marble counter pasting with Jelly/silicon with 15mm dia C.P white powder coated brass 40mm dia heavy duty waste coupling and PVC flexible waste pipe of approved make and quality complete in all respects.

- Providing and fixing European type ceramics ware coupled water closet, white / light color including 3 gallons cistern, P/s Trap, PVC flexible pipe connection, C.P tee stop cock with wall cups, "Grohe, Porta or equivalent".
- Providing and fitting Glazed eastern ware water closet, squatter type (Orissa pattern), combined with foot rest, Best Quality including ceramic Flushing tank Porta, Grohe or equivalent connected by concealed arrangement, tee stop cock for cistern water inlet and C.P connector with nuts and fitting, approved other ancillary material complete in all respect.
- Providing and fixing wash hand basin fixed "Porta or equivalent over counter with all accessories, 1 1/2" dia. P.V.C (D-type) waste pipe, connections to water lines, C.P grating including C.P bottle trap, testing etc.
- Providing and fixing 15mm dia C.P bib cock/mixer "Make" (Faisal, Master, Sonex or equivalent) chrome, C.P pipe 15mm dia. Complete including pipe connection, all fittings, testing etc.
- C.P Muslim Shower with double bib cock with flexible pipe of "(Faisal, Master, Sonex or equivalent)" Powder coated, complete in all respect.
- Provide and fixing soap dish, toilet paper holder and towel rail steel/Aluminum 24’’ long and 3/4" dia.

Plumbing System

- Providing and fixing complete plumbing system by best quality UPVC, PPR piping complete in all respect including connection.
- Kitchen Complete Internal Water (Hot & Cold) & Sewer System Job.
- Toilets Complete Internal Water (Hot & Cold) & Sewer System Job.

Fittings

- 3" Dia UPVC pipe for drainage & Rain water complete in all respect. (Make: Dadex, AGM, Plasco or equivalent as approved consultant)
- 4" Dia UPVC pipe for drainage & Rain water complete in all respect. (Make: Dadex, AGM, Plasco or equivalent as approved consultant)
- 6" Dia UPVC pipe for drainage & Rain water complete in all respect. (Make: Dadex, AGM, or equivalent as approved consultant)
- 32mm PPRC pipe for water supply (Hot &Cold) complete in all respect. (Make: Dadex, AGM, or equivalent as approved consultant)
- Providing and fixing of full way gate valves of bronze trim up to 3" (75mm) dia. With threaded ends and cast iron body bronze trim flanged ends for 4" dia. (100mm) and above Econosto make (Japan) or equivalent or similar for 125 psi together with all additional material required for a complete installation as described in the specification and as shown on drawing.

Floor Drain

- Providing and fixing 100mm dia uPVC floor drain/gully manufactured by UPVC Dadex/ AGM (U.A.E). including , cement concrete (1:2:4) chambers all around with heavy duty Stainless Steel / UPVC grating, hinged on one end of " SONEX, MASTER, FAISAL or equivalent" complete in all respects.

90. Flooring & Special Finishes

Floor Tiles

Commercial office grade full body Porcelain 2’x2’ scratch resistant floor tiles with 4” skirting as per approved color and finish, imported Kale/RAK or equivalent & grouting with matching grout material of Stile, quality laying, testing and commissioning of above items

Fixing of 4" high skirting of same tiles at any height/any floor, complete in all respect.

Washroom/Pantry Tiles (Walls & Floors)

Providing & fixing half body Porcelain imported wall Tiles Kale/RAK 12"x24" (300mm x 600 mm) in Elevation including 1:4 rough plaster, stuck with base coat of Dry bond or approved equivalent, grouting in matching color, incl. Removal of existing plaster etc. to accommodate new finishes, including all cuttings, grouting, and making all details complete in all respect as architects instructions.

Providing & fixing full body Porcelain Kale/RAK **Floor Tiles** of size 12"x24" (300mm x 600 mm) including 1:4 rough plaster, stuck with base coat of Dry bond, grouting in matching color, incl. Removal of existing plaster etc. to accommodate new finishes, including all cuttings, grouting, and making all details complete in all respect as per drawings and architects instructions.

Granite in passage floor

Providing and laying pre polished 3/4" Granite as approved quality and size on any type of flooring, straight or curved, as per drawings, laid with cement slurry over cement sand mortar (1:4) or bond, including filling of joints with grouting material, complete in all respects.

Granite in passage walls

Providing and laying pre polished 3/4" Granite as approved, quality and size on any type of flooring, straight or curved, as per drawings, laid with MS Channel, including filling of joints with grouting material, complete in all respects.

91. Modular Wall Partitioning Fire resistant

Supply of Modular Dry Wall Partition System as per Drawings and Specifications including all accessories, complete in all respect

Dry wall manufacturer should be ISO 9001 Certified, and in large scale drywall manufacturing business for at least 15 years. The proposed Make, Brand should have reference install base in Tier-III Data Centers or Telecom Sites.

Two-hour fire-rated walls are to be installed in various areas, including the Data Center, Network room, System/Backup team room, NOC/infrastructure room, holding room, staging room, and buffer area. These walls will consist of modular drywall partitions, measuring 5 to 6 inches in thickness, and they will be imported for quality assurance. Each partition will comprise double layers of 15mm or thicker fire-resistant type C or X Gypsum boards on both sides.

The partitions will also incorporate galvanized steel metal profiles, including frame studs, standing frames, and steel channels. The installation will encompass insulation, bolts, screws, fittings, and finishing accessories, with heavy-duty anchoring as needed. A 4-inch PVC skirting will be added for both acoustic and noise control, as well as moisture and liquid resistance.

The finishing touch involves three coats of matte enamel fire resistant lead-free paint, which should also dust and moisture resistant. This painting will be applied to both sides of the partition.

Certified to BS 476 or ATSM E119 or DIN 4102-4 or equivalent standard

Note: Gypsum Board, Metal Profile (frame studs/standing frame/steel channels) insulation, bolts, screws, fitting and finishing accessories etc. should be from same manufacturer. Fire Rated Drywall design, installation and commissioning should be validated and endorsed by manufacturer

92. Modular Wall Partitioning

Modular drywall partitions, with a thickness ranging from 5 to 6 inches, will be utilized. These partitions are composed of gypsum boards, each measuring 12mm or thicker. The system will incorporate galvanized steel studs, standing frames, and steel channels supplied by the original equipment manufacturer (OEM).

The installation will include all necessary fittings and finishing details, with heavy-duty anchoring where required. Additionally, a 4-inch PVC skirting will be included to provide both acoustic control and noise reduction. These partitions will also be engineered to resist dust & moisture.

For the final touch, the partitions will undergo a three-coat application of matte enamel paint that is both lead-free and resistant to dust and moisture. This painting will be carried out on both sides of the partition and will feature an approved color and finish.

Note: All installation and finishing material shall be drywall OEM supplied

Installation, testing and commissioning of above items

93. Glass Partition

Supply of following Glass Partitions as per Drawings, complete in all respect

Commercial Office grade 12mm tempered frameless frosted glass partitions

Installation, testing and commissioning

94. Doors

Supply of following Doors as per Specifications, complete in all respect. Finishing with high-quality aesthetics

Fire Rated: A two-hour fire-rated door, constructed from powder-coated G.I./Steel, UL Listed, will be employed. This door will include an automatic closer and a vision panel for enhanced security and acoustic control.

- The door frames and shutters are Zinc Phosphate with epoxy primer and finish with PU paint. All doors should have suitable locking mechanism with 3 keys each
- The internal construction of the door shall be specially designed with infill to give 2 hours fire rating. All the doors will have flame retardant Honey Comb Crafted Paper or equivalent infill.
- The door leaf will have a minimum thickness of 40mm, with a face/back/frame steel measuring 1.2mm. Gaskets will be used to ensure a secure seal, and the hinges, typically 3 to 4 in number, will be made of stainless steel and of the shrouded or concealed bearing type, and with one fitted to each leaf.
- In addition, lever bolts will be installed, with one on the top and one on the bottom of the door. The door will be tested in accordance with recognized standards such as NFPA 252, EN 1634-1, UL 10C, or an equivalent standard like BS 476 Part 22. The installation will comply with NFPA 80 regulations. The proposed make and brand of this door should have a reference installation base in Rated III Data Centers
- The necessary fixing arrangements should be provided to mount the doorframes to the modular dry wall.
- Vision Glass: 2 hours Fire Rated Vision Glass with minimum 8mm thick clear glass in rectangular shape dimensions of 200mm x 300mm to be fixed

Wood Doors: The door will feature a sturdy wooden frame.

- The wood panels will be crafted from natural wood, and the frame will be securely joined at the intersections of its components.

- Each individual component will be carved from a single piece of timber.
- Commercial grade with SS handle.

Glass Doors: Commercial Office grade 12mm tempered glass door including Stainless steel frame on top and bottom, frame should be specialized type for Dry Wall installation, floor spring, bottom patch lock, SS handles, frosting

Bullet Proof Doors: Commercial Office grade 12mm tempered glass bullet proof door including Stainless steel frame on top and bottom, floor spring, bottom patch lock, SS handles

95. Paint Work

Supply of following Paint Works as per Drawings, complete in all respect

Painting two coats of Flame Retardant Durable Matt lead-free, dust/water/moisture resistant paint, on existing concrete/brick walls of approved color and shade and preparation of surfaces with priming, putty/under coat

96. Filing Cabinets

Providing, fabricating and fixing in position filing cabinets consisting of 3/4" thick laminated board box (back, side and shelves), shutter and drawers, with molding 1/2”x3/4” including nails, screws, bolts, hinges, catchers, imported steel glides, locks, handles 3 coat of sprit polish of matching shade on lipping and wood preservative treatment and all other accessories complete in all respects including Anti-Termite treatment. (Interwood, workman or equivalent)

18" Deep (Full height 7 ft. high) & 18" Deep (Low Height 4 ft. high)

97. Kitchen Cabinet

- **Wall Cabinet** Providing and fixing in position hanging type open shelves; cabinet frame made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, cabinet shutter made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, approved, on top, front and side with grooves; 3/8" thick lacquered deodar wood lipping on all edges; including divider, shelves; imported magnetic hinges, lock, stainless steel handles. (Interwood, workman or equivalent)
- **Floor Cabinet** Providing and fixing in position low height type cabinets; cabinet frame made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, cabinet shutter made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, approved, on top, front and side with grooves; 3/8" thick lacquered deodar wood lipping on all edges; including divider, shelves; imported magnetic hinges, lock, stainless steel handles with polish finish as per approved samples. (Interwood, workman or equivalent)

98. Furniture and Fixtures

Supply of following high quality branded Furniture items as per Drawings including all accessories, complete in all respect

Note: The dimensions of furniture and fixtures are flexible as per approval and as best suited for site conditions. All furniture items shall be of high quality and as per approved design and finish

Furniture manufacturer in Pakistan should possess a manufacturing facility equipped with an automated production process and a minimum of a decade's worth of experience

99. Meeting Room:

1 x Meeting Table structure in solid wood/Oak Veneer durable non scratch laminated top, with integrated cable management system on top & cubby for 20 persons.

34 x Ergonomic imported Meeting Chair 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

100. Secretary Room

1 x Manager Desk, structure in solid wood/Oak Veneer durable non scratch laminated top, with integrated cable management system & cubby

1 x Matching Side Rack, two top drawers lockable and bottom two filling, keyboard/CPU Tray

1 x Matching Credenza, two sliding doors lockable

1 x Ergonomic imported High back Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking compliant to international furniture standards

2 x Visitor Chair, cushioned seat and back, leatherite covered with arms and M.S legs

4 x 1 Seater Sofa, cushioned seat and back, leatherite covered with arms

1 x Round Coffee table

1 x Center table

101. Chief IT Room

1 x Manager Desk, structure in solid wood/Oak Veneer durable non scratch laminated top, with integrated cable management system & cubby

1 x Matching Side Rack, two top drawers lockable and bottom two filling, keyboard/CPU Tray

1 x Ergonomic imported High back Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking BIFMA Compliant

2 x Visitor Chair, cushioned seat and back, leatherite covered with arms and M.S legs

1 x 2-Seater Sofa, cushioned seat and back, leatherite covered with arms

1 x 1 seater sofa, cushioned seat and back, leatherite covered with arms

1 x center table

102. CISO Room

1 x Manager Desk, structure in solid wood/Oak Veneer durable non scratch laminated top, with integrated cable management system & cubby

1 x Matching Side Rack, two top drawers lockable and bottom two filling, keyboard/CPU Tray

1 x Ergonomic imported High back Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking BIFMA Compliant

2 x Visitor Chair, cushioned seat and back, leatherite covered with arms and M.S legs

2 x 1 seater sofa, cushioned seat and back, leatherite covered with arms

1 x center table

103. Spare equipment Room:

MS Storage Rack modular/adjustable

Dimension 5’ L x 3.5’ D x 7’ H with 2 shelves & 2 columns. 5’ L x 3.5’ D x 7’ H with 3 shelves & 2 columns. 5’ L x 3.5’ D x 7’ H with 1 shelves & 1 column

104. NOC Room:

Purpose designed Modular NOC Console for Network operation center with 24” deep countertop, Adequate knee and leg space, High-pressure laminate scratch resistant work surface, Vertical and horizontal cable and wire management, brush grommets for cable crop, integrated universal power outlet x 3, Network point (3m or equivalent) Not heavy, but robust, CPU holders and keyboard trays, Ventilated sliding front and rear access panels lift-off for easy access to equipment from the back

Ergonomic imported Operator Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

105. Systems team Room:

Purpose designed Modular NOC Console for Network operation center with 24” deep countertop, Adequate knee and leg space, High-pressure laminate scratch resistant work surface, Vertical and horizontal cable and wire management, brush grommets for cable crop, integrated universal power outlet x 3, Network point (3m or equivalent) Not heavy, but robust, CPU holders and keyboard trays, Ventilated sliding front and rear access panels lift-off for easy access to equipment from the back

Ergonomic imported Operator Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

106. Network team Room:

Purpose designed Modular NOC Console for Network operation center with 24” deep countertop, Adequate knee and leg space, High-pressure laminate scratch resistant work surface, Vertical and horizontal cable and wire management, brush grommets for cable crop, integrated universal power outlet x 3, Network point (3m or equivalent) Not heavy, but robust, CPU holders and keyboard trays, Ventilated sliding front and rear access panels lift-off for easy access to equipment from the back

Ergonomic imported Operator Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

107. SOC Room

Purpose designed Modular NOC Console for Network operation center with 24” deep countertop, Adequate knee and leg space, High-pressure laminate scratch resistant work surface, Vertical and horizontal cable and wire management, brush grommets for cable crop, integrated universal power outlet x 3, Network point (3m or equivalent) Not heavy, but robust, CPU holders and keyboard trays, Ventilated sliding front and rear access panels lift-off for easy access to equipment from the back

Ergonomic imported Operator Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

108. Signage Work

Supply and fixing of Signage Works, complete in all respect

Flush mounted engraved Room Signs & Name Plates. Signages in corridors shall be mounted on right angled brackets

109. False Ceiling

Supply and fixing of false ceiling as per approved design and finish, complete in all respect

False Ceiling shall be as per approved size and in accordance with interior designing works

Imported non-combustible aesthetically designed False Ceiling in Operations Area

110. Interior Designing Work

Offer comprehensive interior design services that encompass top-tier materials such as cladding, wall finishes, flooring, color schemes, and more, for office areas, conference room, NOCs, SOCs, Kitchen, Washrooms, corridors etc. The designs should align with global IT office trends, ensuring a fully furnished and aesthetically pleasing environment

The bidders should include the following design documents in their proposal allowing PURCHASER to select the most suitable solution

Furniture and Fixture Details and Layouts

MEP and Lighting Details and Layouts

Floor and Wall Finish Details and Layouts

Reflected Ceiling Plan Details and Layouts

3D render imaging/video

Note: The Bidder shall appoint a professional interior designer for this job

111. Technical Specifications for DOT Lahore

Data Center Critical Physical Infrastructure:

The primary objective is to construct a highly advanced Data Center that complies with Tier/Rated III standards, as outlined in the TIA 942-B guidelines. This Data Center should incorporate N+1 redundancy and aim for an availability rate of 99.982%. Consequently, bidders should view the provided product and service descriptions as the bare minimum requirements.

Each bidder is strongly encouraged to include in their proposal any products or services they deem necessary or beneficial, whether in addition to or as alternatives to those explicitly mentioned in this bid, in accordance with the TIA-942-B standards.

Interested bidders must visit the site on the specified date and time indicated before submitting their proposals. This site visit will enhance their understanding of the technical specifications and the quantities/design of products/items that need to be finalized

Following table will be used as guideline of power consumption of IT load in the data center.

	Number of IT Rack	Load per Rack (KW)	Total IT Load(KW)
POD- 1	20	6	120

112. IT Racks

113. Product/System Description

Each cabinet shall be designed to provide a secure, managed environment for server and networking equipment. Cabinets shall be designed to accommodate power and cable management accessories that keep network and power cables separate and organized

114. Design Requirement

Physical Specifications:

- Cabinet dimensions, equipment mounting compatibility and weight load ratings:

Internal Height	Internal Width	External Height	External Width	External Depth	Static Rating	Dynamic Rating
42U	19”	1991mm	600mm and 800	1070mm to 1100mm	2000kg to 2200 kg	12000kg to 1500 kg

Above are minimum requirements.

Material Requirements

- All weight bearing components shall be constructed from steel with a thickness no less than > 1.2mm.
- All sheet metal parts shall be painted using a powder coat paint process.
- Plastic materials shall meet or exceed Underwriters Laboratory’s UL94 standard HB rating.

- All interior components of the cabinets shall not have electroplated zinc coating to minimize zincwhiskers near active equipment.
- The cabinet posts should be made of eight-folded profiles by one-off roll forming.

Access and Installation:

- The unit shall provide 42U of equipment vertical mounting space.
- The vertical mounting rails shall be easily adjustable to allow different mounting depths.
- The unit shall include M6 caged nuts, bolts and cup washers, and caged nut tool for the mounting ofequipment inside the unit.
- Both the front and rear doors shall be designed with lift-off hinges allowing for quick and easydetachment without the use of tools.
- Split rear doors are provided for increased service clearance.
- The unit shall include half-height side panels that are removed without tools
- Grounding: All cabinet components such as doors, side panels, roofs, etc. shall be bonded directly to theframe.

115. Ventilation

- The unit shall have ventilated front and rear doors to provide adequate airflow required by the major server manufacturers.
- The unit shall have a minimum total ventilation area for the front door and split rear doors as specified in the table below:

Internal Height	External Width	Perforated Front Door	Perforated Rear Door
42U	600mm	6000 cm^2	6700 cm^2
	800mm	6000 cm^2	6700 cm^2

116. Cable Access

- Top cable management openings provided in the cabinet roof.
- Cable opening edges shall be protected with plastic grommets.
- Bottom cable management opening provided in the cabinet base.
- Side cable management opening shall be provided in the cabinet base. A minimum of two and maximum of four vertical PDU mount cable organizers shall be offered.

117. Environmental

- The unit shall have a minimum of IP 20 rating for protection against touch, ingress of foreign bodies, andingress of water.
- RoHS compliant.

118. Security

- Each cabinet to be provided with optional feature of access control system through finger print and IC card swapping feature.

119. Stabilization

- The unit shall ship with provisions for stabilization in the field using the pallet mounting brackets.
- The unit shall have four (4) adjustable leveling feet to help provide a stable base in the event of an unevenfloor surface and to prevent rolling.

120. Hot / Cold Aisle Containment System

121. System/ Product description

Supporting aisle widths range from 3 to 6 feet (900 mm – 1830 mm).

122. Ceiling Panels

- Ceiling panels shall be clearpanels with aluminum framing OR with full glass design
- Minimum Light Transmission 85% or greater.
- Ceiling panels shall be designed to be supported by the frames of the IT Equipment racks. Ceiling Panel frames sizes shall be suitable to match up with various rack widths, row width,and hot/cold aisle widths.
- The ceiling system shall be designed to permit removal of the ceiling panel from within thecontained zone without the use of tools for service access to the space above the aisle.
- Drop/revolving type resettable ceiling panels for penetration of fire suppression gas in case of a fire

123. Rack Equipment Baying kit

Metal and plastic components shall be supplied to establish consistent spacing between the racks or rack based equipment, and to fill the space to provide an air containment seal at the juncture between two adjacent racks or rack based equipment.

124. Door Frames and Doors

- Metal door frames and doors shall be provided to establish air containment at the end of two rows of racks. The door frame system shall match the height of the rack-based equipment and match the design width of the contained aisle.
- Doors shall be sliding, to permit access into the contained aisle for maintenance or servicing. Standard door operation shall not interfere with access or service on any rack or rack-based equipment.
- Doors shall be provided with a minimum 8mm thick glass window, handles and latches. Door locks and three matching keys per door
- Proximity switches for open/closed status
- Automatic door closure system for sliding door
- Sliding Doors shall be provided with swing-open functionality in case of emergency

inside the aisle.

125. Frames and Components seal

Adequately seal Aisle joints, minimize open gaps between containment system components, IT Equipment racks and rack based equipment.

126. Fire Safe Ceiling

- The Ceiling System complies to UL484, EN 55022, EN 55024, EN 61000-3-2,EN 61000-3-3, EN 60950-1, CFR 47 FCC Part 15:2011, ANSI C63.4, ICES-003, AS/NZS CISPR 22.
- Ceiling material should be fire resistant
- Ceiling panels can be fixed or rotated (automatically controlled by the magnetic locks)
- In case of fire, the magnetic locks open and rotating ceiling open automatically due to gravity force. The design ensures that fire extinguishing gas enters the hot aisle containment.

127. Lighting

- Lighting should be provided in the containment.

Specification

d. Watts = 5-7

e. Lens = frosted

f. Lumens per foot > 180

128. Sensor and camera

Aisle should be installed with the camera, temperature and humidity sensor, smoke detector, aisle lighting, infrared sensor, and reserved hole for fire extinguishing nozzles.

129. Rack Power Distribution Unit

130. Product /system description

For purposes of distributing power within an IT enclosure, rack mount power distribution units shall be available for installation within the IT enclosure. The rack mount power distribution units shall be capable of being installed in the back of the accompanying enclosure to consume zero U- space in the rear of the rack and shall not require tools for installation within the rack.

131. Design requirement

- **Single phase**

H. **Rating:** 32A - 1Phase
I. **Type:** Metered & monitored
J. **Input Voltage:** 230 VAC 1 Phase
K. **Input Frequency:** 50Hz
L. **Input Connection:** IEC309 32A

M. Output Connections C13 ≥12 & C19 ≥3
N. **Mounting** Vertical Zero U

H. **Rating:** 16A - 1Phase
I. **Type:** Metered & monitored
J. **Input Voltage:** 230 VAC 1 Phase
K. Input Frequency: 50Hz
L. **Input Connection:** IEC309 16A
M. **Output Connections:** C13 ≥ 12 & C19 ≥3
N. **Mounting:** Vertical Zero U

- **Three Phase**

H. **Type:** Metered & monitored
I. **Rating:** 32A - 3Phase
J. **Input Voltage:** 400 VAC 3 Phase
K. **Input Frequency:** 50Hz
L. **Input Connection:** IEC309 32A
M. Output Connections C13 ≥12 & C19 ≥3
N. **Mounting** Vertical Zero U

Required Features:
k) Low-profile in depth
l) Environmental monitoring port for external temperature/humidity monitoring (optional)
m) Full-featured network management capability via web, SNMP
n) User-interactive LCD display for local access
o) Field-replaceable network management module (preferred)
p) Active current measurements (amps)
q) Active power measurements (including volts, amps, real power (kW) and energy (kWh))
r) User-customizable alarms and warnings
s) Embedded log memory to record/review/report
t) Compliance: CE EN55035, EN55032, EN55024, CE, TUV, EN/IEC62368-1, RoHS & Reach

132. Uninterruptible Power System

133. Product/System description

Three-phase, double conversion on-line, continuous operation, solid state uninterruptible power supply (UPS). It will provide power conditioning and on-line power protection for the critical loads. UPS will of modular hot swap construct. Power module, static transfer switch, and management module shall be hot/safe swap without transferring the unit on by pass.

134. Design requirements

The UPS shall be housed in a freestanding cabinet. Maintenance shall be possible from the front and the rear.

- 3-Phase Modular UPS 25kW scalable to 300 kW, 400 V, with bypass hot swappable switch
- Output power factor: 1.0.
- The UPS shall support installation with either 3-wire (L1, L2, L3, PEN) or 4-wire (L1, L2, L3, N, PE).

- The UPS shall contain a static bypass switch and a display. The UPS shall be of the double conversion on-line topology with power factor corrected inputs.
- The UPS shall be sized for **120kW** rating plus one additional module.
- The UPS battery shall be sized for 30mins backup @0.9PF
- The UPS shall be using a modular design in which power functions, static bypass, and system control are embedded in modules for optimal MTTR.
- UPS must support to run at least 4 UPS in parallel
- The system can detect bus capacitor rest running life and give alarms before the capacitor failure
- External Service Bypass Panel

System input

- Nominal input voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V). Input voltage window: 305 V to 485
- Input frequency range: 40-70 Hz.
- Input power factor: 0.99
- Total harmonic distortion: < 3 % (linear load)

System output

- Nominal output voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V).
- Output voltage tolerance: +/- 2% for symmetrical loads; +/- 3% for asymmetrical loads.
- Dynamic load response: +/- 5% after 2 ms; +/- 1% after 50 ms
- Output frequency: Synchronized to mains over the range of 45-65Hz in normal operation, ± 0.5 Hz in battery operation
- Output voltage harmonic distortion:
- <3% at 100% linear load
- <3% at 100% non-linear load
- Overload capability:
- 150% for 1 minute (normal operation)
- 125% for 10 minutes (normal operation)
- 125% for 1 minute (battery operation)
- 110% 60 minutes (bypass)
- Output power factor: 1.0
- Audible noise at full load: < 75 dB

135. Operation Modes

- **Normal:** In double conversion operation, the UPS supports the load with conditioned power
- **Battery:** If the utility/mains supply fails, the UPS transfers to battery operation and supports the load with conditioned power from the DC source.
- **Requested and Forced static bypass**: The UPS can be transferred to requested static by pass and forced by pass available

- **Internal Maintenance Bypass:** UPS shall have internal maintenance by pass available
- **External maintenance bypass**: When UPS transfers to external maintenance bypass operation. The load is supplied with unconditioned power from the bypass source. Service can be performed on the entire UPS during external maintenance bypass
- **ECO mode:** UPS shall have Eco mode operation option

136. Components

Rectifier

- The UPS shall include an active power factor corrected rectifier.
- The battery charging voltage shall be compensated against temperature variations (battery temperature compensation) to always maintain optimal battery float charging.
- Input power factor shall be 0.99 lagging at 100% load without the use of passive filters. Rectifier shall employ electronic waveform control technology to maintain the current sinusoidal.
- Pulse Width Modulation (PWM) current control shall be used. Digital Signal Processors (DSP) shall be used for all monitoring and control tasks.

Inverter

- The inverter shall consist of fast switching IGBTs.
- Inverter shall be PWM controlled using DSP logic.
- The inverter modules shall be rated for an output power factor at 1.0.
- Nominal output voltage shall be 400 V 3-phase (adjustable for 380 V, and 415 V).

Static bypass switch (hot swappable)

- The static bypass switch shall consist of fully rated Silicon Controlled Rectifiers (SCRs).
- The static bypass switch shall be of modular design.
- The static bypass switch shall automatically transfer the load to bypass supply without interruption after the logic senses one of the following conditions:
    - Inverter overload beyond rating.
    - Battery runtime expired and bypass available.
    - Inverter inoperable.
    - Control system inoperable.
- The static bypass switch shall automatically retransfer from bypass to the inverter.

Battery

- The UPS support 30 min backup time @ 0.9PF.
- The Lithium battery shall be of LFP type
- Monitoring required at battery module level, battery cabinet level and UPS system level.
- 5-7 Inches LCD display or equivalent display system
- High energy density
- The entire system complies with CE/CB/ROHS/REACH
- The cells comply with UL1642、IEC62619、UN38.3 and provides the certificate
- Shall comply with Internal short circuits, fire resistant, overcharging, high-temperature short circuiting, compression testing, drop testing, heating trials, temperature cycling evaluations,

shock resistance, vibration resistance, low air pressure conditions, and high-power charging tests

- Provide third-party test reports
- Cells acupuncture test report verified from renowned third party, ·
- Battery string in the lithium battery cabinet has fuses and circuit breakers for protection.
- Lithium battery cabinet is configured with BMS system
- Battery monitoring shall be provided at the system level and also Battery module leve.
- Batteries use natural heat dissipation.
- Batteries can be installed against walls.
- IPX1 protection level with third-party report.
- CE certificate
- Shock proof certificates
- Fire protection system, built-in within cabinet or module level.
- The UPS shall incorporate a battery capacity test that will determine the available runtimes.
- Minimum 10 years design life

Mechanical

- The UPS shall be housed in a freestanding cabinet with casters.
- The cable entry shall be from the top/bottom of the UPS.
- The cabling section shall be large enough to accept different type of cables.
- The UPS shall have ingress level of minimum IP20.
- The UPS shall have a seismic kit option.

Display, controls, and alarms

- A color 5-7 LCD touch screen for operation and monitoring
- Monitoring key parameters like input voltage, current, frequency, output voltage, current, and battery status (voltage, current, and temperature).
- The display shall provide user-friendly access to status information and active alarms in various operational modes, including Normal, Battery, Bypass, Overload, Battery Discharging, and Low Battery Voltage.

Accessibility

Software and connectivity

- The Ethernet Web/SNMP Adaptor shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments.
- The UPS shall have option of Modbus interface.
- The UPS shall be equipped with dry contacts (inputs, outputs) for user-assignable alarms or remote monitoring.

Remote UPS monitoring

- Web monitoring: Remote monitoring shall be available.
- Simple Network Management Protocol (SNMP)

Software compatibility

- The UPS manufacturer shall have available software to support shutdown and or remote monitoring.

Parallel capability

Up to 4 units

Warranty

5 years for UPS (all components) & 5 years for batteries

External service bypass shall be provided

Approvals

IEC 62040-1: 2017, Edition 2.0, Uninterruptible Power Systems (UPS) - Part 1: General and safety requirements for UPS.

EN IEC 62040-1: 2019 | A11:2021.

IEC 62040-2: 2016, Edition 3.0, Uninterruptible Power Systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements.

EN 62040-2:2018, Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-3: 2021-03, Edition 3.0, Uninterruptible Power Systems (UPS) - Part 3: Method of specifying the performance and test requirements.

IEC 60721-4-2 Level 2M2

Factory testing

Factory test report shall be provided for the components and complete unit.

137. Modular Power Distribution for UPS Output

138. Product/System description

- The PDU shall provide a mechanical means of complete isolation of the input source from the critical output distribution.
- The PDU shall contain the appropriate modular distribution panel within a Rack enclosure suitable for installation in a data center environment.
- Factory assembled and tested
- All system components are housed in a Rack
- The PDU and associated equipment shall operate in conjunction with a primary power supply to provide quality uninterrupted power for mission critical, electronic equipment load.
- All programming and miscellaneous components for a fully operational system as described in this Section shall be available as part of the PDU.
- Real-time monitoring over the status of branches: voltage, current, power, load rate, temperature of each terminal of circuit breaker, status of switches, send alarm when the temperature is abnormal.

139. Design requirement

- Input: AC Nominal Input Voltage: 400V/230V 3-phase, 3-Wire+N+G, 50/60Hz
- Input Switch: MCCB
- Architecture and construct : Dual bus architecture, IP 20

- System Capacity:
- The PDU shall support provide 200-250 kW output.
- Testing and quality assurance: All circuit breakers shall be 100% factory tested to ensure the highest quality for the PDU. In addition, the PDU shall be tested with 100% load and all panel circuit breakers shall be 100% tested.

140. Displays & Controls

- **Display unit:** PDU shall have a microprocessor-controlled 5 to 7 inch color display unit located on door in front of the system. The display shall consist of an alphanumeric display allowing retrieval of active alarms, system level programming,and event history of the PDU.
- **Metered Data:** The following data shall be available on the alphanumeric display:

  l) Year, month, day, hour, minute, second of occurring events

  m) Output voltage by phase

  n) Branch circuit status

  o) Current and power used by the load

  p) Load as a percentage of capacity

  q) Total energy usage

  r) Volt meter

  s) Power factor

  t) Alarms

  u) Log

  v) Harmonics

Alarms: The display unit shall allow to configure alarms and there threshold.

141. Remote Monitoring

The following methods of remote PDU monitoring shall be available:

- Web Monitoring: Remote monitoring shall be available via a web browser.
- RS232 Monitoring: Remote PDU monitoring shall be possible via RS232 serial port connection.
- Simple Network Management Protocol (SNMP).

142. Power Distribution

- Multiple power distribution options shall be available in the Power Distribution to cater the rack PDU.
- **Event log:** The display unit shall provide a time and date stamped logs.

143. UPS for NOC, SOC, System Room, Network Room and other IT load

144. Description

Three-phase, double conversion on-line, continuous operation, solid state uninterruptible power supply (UPS). It will provide power conditioning and on-line power protection for the critical loads. UPS will of modular construct.

145. Design requirement

The UPS shall be housed in a freestanding cabinet. Maintenance shall be possible from the front and the rear.

- 3-Phase UPS 30 kW, 400 V, with bypass switch
- Output power factor: 1.0.
- The UPS shall support installation with either 3-wire (L1, L2, L3, PEN) or 4-wire (L1, L2, L3, N, PE).
- The UPS shall contain a static bypass switch and a display. The UPS shall be of the double conversion on-line topology with power factor corrected inputs.
- The UPS shall be sized for 30 kW rating
- The UPS battery shall be sized for 30mins backup @P.F 0.9
- The UPS shall be using a modular construct design.
- UPS must support to run at least 4 UPS in parallel
- External service bypass

System input

- Nominal input voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V). Input voltage window: 305 V to 485
- Input frequency range: 40-70 Hz.
- Input power factor: 0.99
- Total harmonic distortion: < 3 % (linear load)

System output

- Nominal output voltage rating: 400 V 3-phase (adjustable for 380 V, and 415 V).
- Output voltage tolerance: +/- 2% for symmetrical loads; +/- 3% for asymmetrical loads.
- Dynamic load response: +/- 5% after 2 ms; +/- 1% after 50 ms
- Output frequency: Synchronized to mains over the range of 45-65Hz in normal operation, ± 0.5 Hz in battery operation

Output voltage harmonic distortion:

- <3% at 100% linear load
- <3% at 100% non-linear load

Overload capability:

- 50% for 1 minute (normal operation)
- 125% for 10 minutes (normal operation)
- 125% for 1 minute (battery operation)
- 110% 60 minutes (bypass)
- Output power factor: 1.0
- Audible noise at full load: < 75 dB

146. Operation Modes

- Normal: In double conversion operation, the UPS supports the load with conditioned power
- Battery: If the utility/mains supply fails, the UPS transfers to battery operation and supports the load with conditioned power from the DC source.
- Requested and Forced static bypass: The UPS can be transferred to requested static by pass and forced by pass available
- Internal Maintenance Bypass: UPS shall have internal maintenance by pass available
- External maintenance bypass: When UPS transfers to external maintenance bypass operation. The load is supplied with unconditioned power from the bypass source. Service can be performed on the entire UPS during external maintenance bypass
- ECO mode: UPS shall have Eco mode operation option

147. Components

Rectifier

- The UPS shall include an active power factor corrected rectifier.
- The battery charging voltage shall be compensated against temperature variations (battery temperature compensation) to always maintain optimal battery float charging.
- Input power factor shall be 0.99 lagging at 100% load without the use of passive filters. Rectifier shall employ electronic waveform control technology to maintain the current sinusoidal.
- Pulse Width Modulation (PWM) current control shall be used. Digital Signal Processors (DSP) shall be used for all monitoring and control tasks.

Inverter

- The inverter shall consist of fast switching IGBTs.
- Inverter shall be PWM controlled using DSP logic.
- The inverter modules shall be rated for an output power factor at 1.0.
- Nominal output voltage shall be 400 V 3-phase (adjustable for 380 V, and 415 V).
- Static bypass switch
- The static bypass switch shall consist of fully rated Silicon Controlled Rectifiers (SCRs).
- The static bypass switch shall automatically transfer the load to bypass supply without interruption after the logic senses one of the following conditions:

Inverter overload beyond rating.

Battery runtime expired and bypass available.

Inverter inoperable.

Control system inoperable.

The static bypass switch shall automatically retransfer from bypass to the inverter.

Battery

- The UPS support 30 min backup time @ P.F0.9
- Lead acid maintenance free battery (VRLA)
- Battery Monitoring required at cabinet level
- Deep cycle (80% DOD > 400 Cycle)
- 10-12 years design life

Mechanical

- The UPS shall be housed in a freestanding matching cabinet with casters.
- The cable entry shall be from the top/bottom of the UPS.
- The cabling section shall be large enough to accept different type of cables.
- The UPS shall have ingress level of minimum IP20.
- The UPS shall have a seismic kit option.

Display, controls, and alarms

- A color 5-7 LCD touch screen for operation and monitoring
- Monitoring key parameters like input voltage, current, frequency, output voltage, current, and battery status (voltage, current, and temperature).
- The display shall provide user-friendly access to status information and active alarms in various operational modes, including Normal, Battery, Bypass, Overload, Battery Discharging, and Low Battery Voltage.

Software and connectivity

- The Ethernet Web/SNMP Adaptor shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments.
- The UPS shall have option of Modbus interface.
- The UPS shall be equipped with dry contacts (inputs, outputs) for user-assignable alarms or remote monitoring.

Remote UPS monitoring

- Web monitoring: Remote monitoring shall be available.
- Simple Network Management Protocol (SNMP)
- The UPS manufacturer shall have available software to support shutdown and or remote monitoring.

Parallel capability

Up to 4 units

Warranty

5 years with batteries

External service bypass shall be provided

Approvals

IEC 62040-1, IEC 62040-2, IEC 62040-3, IEC 60721-4-2 Level 2M2

Factory testing

Factory test report shall be provided for the components and complete unit.

148. Cooling Units for Data Center

149. Summary

The environmental control system must be purpose-designed for precise temperature and humidity regulation. It will autonomously oversee and regulate heating, cooling, humidification, dehumidification, and filtration within the controlled space. The system must adhere to the most stringent engineering and manufacturing standards, and it should be floor-mounted (InRow) with a configuration for horizontal airflow, enabling a draw-through air pattern to ensure uniform air distribution across the entire coil surface. Complete CFD analysis shall be the part of proposal.

150. Design Requirements

The system shall be as described in the following specification as manufactured.

- 30-35 KW or higher sensible cooling 24-29KW at 46C ambient / outdoor temperature
- Cabinet width = 300mm
- Air Volume: >/= 3300-3600 CFM
- Humidifier capacity: 1.5-2 kg/hr.
- Reheat capacity: 4 kW
- Electrical supply: 400 V, 50 Hz.
- The Cooling unit must be equipped with surge protection device.
- Built in Dual power supply with display. The precision cooling units should have power detection functions overvoltage, under voltage, high frequency, and low frequency), fault diagnosis, alarm recording, automatic protection, automatic recovery, and automatic restart functions.

151. Cabinet Construction

- Exterior panels shall be 16-18 gauge steel with insulation.
- The frame shall be constructed of 15-16 gauge formed steel welded for maximum strength.
- All units shall provide maintenance from the front and rear, allowing units to be placed within a row of racks. All exterior panels and frame shall be powder coated for durability.
- Units shall include casters and leveling feet to allow ease of installation in the row.

152. Fans

Variable speed DC fan with built in n+1 redundancy.

153. Microprocessor based monitoring, configuration control and alarm system:

- Display shall allow monitoring and configuration of the air conditioning unit through a menu based control. Functions include status reporting, set-up, and temperature set points.
- Controls: The microprocessor controller allow the user to navigate between menus, select items, and input alpha numeric information.
- Alarms: Controller shall activate a visible and audible alarm in the occurrence of multiple events.
- Logging: The microprocessor controller shall log and display all available events. Each alarm log shall contain time/date stamp as well as operating conditions at the time of occurrence.

154. Network Management Card

- The unit shall include a network management card to provide management through a computer network through TCP/IP. Management through the network should include the ability to change set points as well as view and clear alarms.
- Units shall support Modbus TCP/IP and RTU.

155. Cooling Coil & Condensate Pan

- Cooling coil shall use raised lance type corrugated aluminum fin copper tube coils. Thick wall. Coil end supports shall be a minimum 17- 18 gauge galvanized steel. Coil shall be rated for a maximum pressure of 600-650 psig (4200- 4482 kPa), and the coils are certified in accordance with UL207 or equivalent safety standard Coil has brass distributor and copper distribution tubes.

156. Compressors

- Variable Speed Compressor, DC inverter or equivalent
- Supports adjust cooling capacity according to heat load.
- Compressor is electrically protected.
- Compressor utilizes a noise cap for noise reduction.
- Sight glass provided.
- Compressor shall soft start to minimize in-rush current.

157. Condensate Pump

- A single factory installed and wired condensate pump shall pump at 28-32 l/h at 4-4.5 m (13-14 ft.) of head.

158. Condensate Reservoir

- Each pump shall have a condensate reservoir made of corrosion resistant material.

159. Filters

- The standard filters shall be 30% efficient per ASHRAE Standard 52.1 or 52.2,). Filters shall be EN779 G4 efficient. Filters shall be replaceable without shutting down the cooling unit.

160. Humidifier

Humidifier shall be able to modulate capacity. The humidifier shall be self-contained, steam generating type/ Infrared factory piped and wired, automatic solid-state control circuit. Humidifier canisters shall be replaceable. The humidifier controller shall communicate directly to the microprocessor controller and provide complete status and control at the operator interface. Humidifier shall control flush cycling and conductivity via automated controls. Humidifier shall be capable of producing up to (3-4 kg) of steam per hour.

161. Electric Reheat

- Reheat elements shall be low watt density, shall be electrically and thermally protected by both automatic and manual reset cutouts. Reheat capacity shall be 4 kW.
- Heating the air to bring it up to the room set point
- Maintain dry bulb temperature in the room during operation in dehumidifier mode.
- Reheat coils shall be stainless steel.
- Heater shall be provided with self-engaging electrical connectors upon installation.

162. Temperature and Humidity Sensors

- The precision cooling units should be configured with built-in temperature sensors and built-in temperature & humidity sensor to measure the temperature more accurately and increase system reliability. Temperature sensor accuracy shall be within +/– 1 degree F accuracy.
- Shall have internal Humidity Sensors

163. Ambient Protection

- InRow DX systems shall be equipped with a recommended outdoor flooded receiver package suitable for ambient temperatures down to -40C/-40F.

164. Cable Water Detector

- A leak detection sensing cable shall be shipped loose with the unit. If water or other conductive liquids contact the cable anywhere along its length, the main controller visually and audibly annunciates the leak.
- Water Leak Detection System (covering all potential areas of water leakages in Server, UPS and Telco Rooms & supporting automatic control of isolation valves/water supply in case of leak detection)

165. Alarms

- The system's comprehensive alarm list covers a spectrum of potential issues that could occur. They encompass various aspects such as cooling, air filtration, temperature, humidity, and pressure monitoring. Additionally, they cover faults related to sensors, fans, compressors, and other critical components.

166. Outdoor Unit Placement

- The condenser should be able to be placed in horizontal arrangement, up to 6-8m placement below In Row and 25-30m above in row unit.

167. Outdoor Unit Protection

- Have energy efficient fans. Complete units must be corrosion resistant and designed for the harsh environment. Conformal quoting shall not compromise the heat rejection efficiency of the unit.
- **Warranty:** 5 years comprehensive warranty for complete system

168. Cooling Unit for Power Rooms

169. Summary

The environmental control system will be purposefully designed to excel in regulating precise temperature and humidity within the designated space. This system will have the capability to automatically oversee and manage functions like heating, cooling, humidification, dehumidification, and air filtration.

Moreover, it will adhere to the most stringent engineering and manufacturing standards. The system will be floor-mounted and configured to provide conditioned airflow with a front-flow/horizontal discharge, with the option for (front), (bottom), or (rear) return airflow.

Design Requirement

The system shall be as described in the following specification as manufactured.

1. Sensible net cooling capacity: 20-25 kW
2. Air Volume: 2400-2700 CFM
3. Humidifier capacity: 2-3 kg/hr.
4. Reheat capacity: 3-6 kW
5. Electrical supply: 400 V, 50 Hz
6. Air flow discharge: Front Flow
7. Must have built-in Dual input power
8. Must have built-in surge protection min 6 KV

170. Cabinet and Frame Construction

The framework, electrical panel frame, and internal parts of the unit frame shall be constructed from hot zinc plated sheet steel connected by rivets to ensure durability and stability. Internal panels coated with epoxy-polyester paint to isolate compartments affected by the air flow. The external panels are coated with epoxy-polyester paint, which ensures long-term durability of the original features.

The standard panels shall be lined internally with heat and sound proofing and has excellent sound-insulation properties

171. Return Air Filters

The standard filters shall have a EU4 filtering rating, have to be mounted upstream from the cooling coil inside the unit, and to be easy to remove. EU5 & EU8 rated filters option available with the unit.

172. Fans

- EC Centrifugal fans
- The fans shall have high performance, very low power consumption and low noise level

- The performance data to exceed ERP 2015 requirements

173. Controller

- The control system shall have e 4-7 inch touch-screen display interface.
- The microprocessor control board shall contain the settings and programs of all the stored operating parameters which can be used, viewed, and set on the user display interface.
- The user interface touch screen display shall be externally mounted, password protected, and menu driven.
- The user interface shall allow modification of adjustable parameters.
- The user interface shall have integrated USB port for easy upgrade of the software and data download
- The user interface shall be integrated with TCP/IP. Compatible with Lon Works Module or RS485 Module (Modbus RTU or BACnet MS/TP). Operating parameters, monitor the trend of the main working parameters, and view alarm messages are possible through controlling panel.

174. Network Management Card

- The unit shall include a network management card with TLS 1.2 cybersecurity. Provide management through a computer network through MODBUS or BACnet TCP/IP.
- Group control
- Up to 8-10 indoor unit shall be grouped together via A-link to share operational set points and commands.
- Group control shall automatically rotate units into standby mode based off run-hours when IT load is not high enough to require all units to be active.

175. Control System Functions

- Temperature and Humidity Control based on adjustable set points.
- Alarm signaling local or via remote
- Alarm History, logs 90-100 recent events with date and time stamp
- Alarm signal contacts configured on the User Interface
- Calculating operating hours and start-up cycles of major components
- "Automatic Restart" after power is restored
- Remote switching on/off of the unit

176. Password protection

- Hour Meter calculates operating hours and start up cycles of major components
- View status of all unit components and sensors connected to the control board.
- The rotation of the units can be made according to the fixed cycle time or in case of alarm.

- "Manual Override" function shall allow manual control of the main components without excluding possible remote control.
- Symbols appear on the user interface to show status of unit and components.
- Potential of setting a dual set point for temperature (in both cooling and heating) and humidity (both when dehumidifying and humidifying), which can be modified from a remote terminal.
- Flexible management of the digital alarm outputs providing the possibility of independently addressing all available outputs (usually two) and to determine if the contact state must usually be open or closed

177. Set Points

Temperature and humidity set points shall be pre-set at the factory so the control functions correctly, maintaining standard conditions in the room.

178. Alarms/Events

The microprocessor controller shall activate a visible and audible alarm in the occurrence of set point violations related to equipment components performance, environmental set points, operational set points and points.

179. Logging

The microprocessor controller shall log and display all available events. Each alarm log shall contain time/date stamp as well as operating conditions at the time of occurrence. Controller shall display the run time hours for major components

180. Compressor

- The Room Cooling Direct Expansion (DX) systems shall utilize DC inverter/ Digital scroll/ Scroll compressor.
- A solenoid valve shall be included on each liquid line to avoid liquid migration to the evaporating section of the system
- Liquid receiver with rota lock on-off valve and safety valve

181. Refrigerant

The refrigeration system shall be designed to use R-410A.

182. Evaporator Coil

The evaporator coil shall be designed with a large front surface area in order to have an elevated SHR and a low air velocity through the coil. This prevents condensation carry over and reduces internal pressure drop in the unit and ensures a more efficient heat exchange during both the cooling and de-humidification. The evaporator coil shall be made from copper tubes mechanically expanded on aluminum fins.

Preferably coil shall be positioned upstream from the fans and shall have a stainless-steel condensate drain pan with a flexible drainage tube and an integrated siphon.

183. Direct Expansion Air Cooled System

Air-Cooled Systems

- The indoor unit shall consist of an evaporator section including evaporator coil, fans section, controls, electrical section, and refrigerant piping internal to the evaporator coil and compressor will be sealed with a positive pressure of dry nitrogen.
- Refrigerant piping required for interconnecting the evaporator and condenser sections shall be field supplied and installed to include the refrigerant R-410A required to charge the system.

Remote Air-Cooled Condenser(s)

- Shall be designed for high ambient temperatures operations of 46°C.
- Shall be a single or dual refrigerant circuit with copper tubes and aluminum fins, complete with low speed axial fan(s) to reduce the sound pressure level.
- Frame shall be made of galvanized steel with epoxy powder coat with weather-resistant capabilities.
- Electrical enclosure shall be weatherproof with a main disconnect mechanically interlocks with the electrical panel.
- Axial fans shall be fused and have heavy gauge, vinyl-coated, steel wire fan guards.

Humidification

- Steam/ infrared generating humidifier shall be able to modulate capacity.
- Humidifier shall be self-contained, factory piped and wired, with automatic solid-state control circuit.
- The humidifier controller shall communicate directly to the microprocessor and provide complete status and control at the user interface (LCD display).
- Humidifier canisters shall be disposable.

Heating system

- Electric Heat operate in stages to optimize the energy utilization and limit overheating there by increase their durability.
- Heating the air to bring it up to the room set point
- Maintain dry bulb temperature in the room during operation in dehumidifier mode.
- Condensate Pump shall fitted with humidifier. Have a capacity of 900-950 LPH at 0 m with a maximum lift of 6-7 m. Pump shall be designed with an integral dual float switch, pump and motor assembly.
- Unit shall have a Leak Detection Sensor

Network Management Card

- The unit shall include a network management card to provide management through a computer network through TCP/IP.
- Units shall support Modbus TCP/IP and RTU.

Warranty

5 years comprehensive warranty for complete system

184. DCIM & Environmental Monitoring System

185. Summary

- This specification outlines the operation and capabilities of a Data Center Infrastructure

Management system (DCIM), which is referred to as the DCIM. The DCIM will be a centralized server appliance, equipped with a client console or web client.

- The architecture of this system should facilitate the expansion of the number of devices it can manage. It must be designed to effectively manage devices present on both the public LAN and the private LAN. Additionally, the system should have an architecture that allows for the monitoring of a variety of devices, including Multi-Vendor Simple Network Management Protocol (SNMP) devices, Modbus TCP devices, and Modbus RTU devices connected to a Modbus RTU-to-Modbus TCP gateway.
- Management Protocol (SNMP) devices, Modbus TCPdevices, and Modbus RTU devices that are connected to a Modbus RTU-to-Modbus TCP gateway.
- This specification shall provide infrastructure management of the Uninterruptible Power System (UPS); Power Distribution Unit (PDU); Rack PDU (rPDU); Computer Room Air Conditioning (CRAC); In-row Cooling; Environmental Sensors; Automatic Transfer Switch (ATS) with supplied Generator; SNMP devices from multiple vendors (ex. UPS, PDU, CRAC, CCTV, Access Control, VRF, Fire, LV Distribution, and rPDU);Modbus devices, allied infrastructure equipment and systems.
- The DCIM and associated equipment shall operate in conjunction with an existing networkinfrastructure to provide system management of the systems described above.

186. Design Requirement

- All materials and equipment employed must consist of standard components that are commonly manufactured, readily available, and not uniquely designed for this particular project. The data center infrastructure system, including the DCIM, should have undergone comprehensive system testing and demonstrated its functionality in real-world applications before being installed on this project
- The DCIM shall be a server appliance, or a virtual appliance, with a specified HTTP or HTTPS connection to access the user interface, and standard TCP protocol connections for notifications.
- The server appliance system shall be scalable up to 500-600 managed/monitored devices.
- The manufacturer will supply an off the shelf management system that will require no factory customization to meet customer requirements.
- The system architecture shall be scalable, allowing for future enhancements.
- The DCIM shall manage/monitor devices both on a public LAN and on a private LAN created by the management system.
- The DCIM shall be capable of hosting additional add-on modules that support a Building Management System (BMS), a Power Management System, and allow a user to perform Physical Threat and Environment Management and Surveillance.
- The DCIM shall be capable of integrating with other management systems.

187. Modes of Operation

- **System Overview:** The hardware server DCIM shall be a centralized server appliance that is accessed remotely from a mobile device or client workstations/servers via a HTTP or HTTPS connection. The virtual appliance DCIM shall be a centralized application that is accessed

remotely from client workstations/servers via a HTTP or HTTPS connection. No client-based services shall be used as a substitute. Microsoft System Center Operations Manager, Microsoft System Center Essentials, IBM Tivoli, HP Operations Manager, integration shall be supported. A Web Services Open API guide shall be made available by the DCIM vendor. The DCIM shall send alerts from the devices it manages to a valide-mail account accessible via mobile device; web page via HTTP POST; an FTP server; SNMP traps to a Network Management System

- **Modbus:** The DCIM shall provide access to MODBUS TCP Output Moduleused to support the Building Management System (BMS).
- The DCIM client application shall provide a Monitoring perspective and Surveillance perspective to display device status, device data, device events, andsurveillance video; an Alarm Configuration perspective to provide notification options; a Reports perspective to access reports about monitored devices and provide configuration and graphing/trending options; and a Power Management perspective.

188. Monitoring Perspective

Device Groups

- The user shall be able to define groups i. This shall allow a user to add groups, to all Devices group or on a sub groupand select Create Device Group.
- The user shall control access to each of the groups by defining the usersthat have access to that device group.
- Devices shall have the ability to reside in multiple groups.

Device View

- The DCIM shall display all discovered devices in a separate window and display device status of normal, warning or critical. This status shall be realtime status and updated as events occur.
- The Device View shall display the total number of discovered devices andthe number of displayed devices.
- The Device View shall allow the user to sort the displayed columns.
- The Device view shall allow the user client preferences to highlight a devicethat is in a critical state.
- The Device View shall have user-selectable columns.
- The user can :Add Devices, Delete Devices, Remove from Device Group Outlet Control, View Device Sensors, Request Device Scan, Show Alarm History, Generate Sensor History Report and graphs, Create threshold, SNMP Device Configuration, Appliance Configuration, Change Device Type, Add Custom Property
- The Device View pane shall contain a free text field to search for devices.

189. Reports Perspective

- Data shall be collected for the Uninterruptible Power System (UPS), Power Distribution Unit (PDU), Rack PDU (rPDU), Computer Room Air Conditioning (CRAC), Environmental Sensors, Automatic Transfer Switch (ATS) with supplied Generator, Surveillance Camera's

Multi-vendor SNMP devices (UPS, PDU, CRAC, and rPDU), and other infrastructure systems as specified.

- Data collected over time must be stored on the server appliance for extracting and trending and /or can be exported to a Network Attached Storage Server (NAS).

190. Configuration

- The DCIM Should be capable of device recovery, mass configuration of devices, and mass update of the devices.
- The DCIM shall have the ability to be scaled to manage up to 3500-4000 devices,with additional device licenses.
- The user shall have the ability to view events from the entire DCIM from anAlarms view.
- The user shall have the ability to click on a managed device in an alarm state and display the specific nature of the alarm in an Alarm Details pane.
- The user shall have the ability to configure notification for managed devices
- The user shall have the ability to acknowledge active alarms and suppressfuture notifications.
- The DCIM shall have SMS support,
- The DCIM shall contain an Alarm History for all managed devices.
- The Alarm History shall display the Time Occurred, Time Resolved, Status,Description, Severity, Device Hostname, Parent Device, and Sensor.
- Shall have option to view device groups and subgroups, view the active alarms, access to view active alarm details, suppress and resume sending notifications.
- The DCIM web client shall provide a Home view to display customizeddata; a Monitoring view to display a hierarchical list of device groups and subgroups, and a list of active alarms; an Event Log view to display control, device, security, and system events; a Saved Reports view to display saved reports created on the installed client, and graphs for numericsensors; and a Search view to display data matching search criteria.

191. DCIM Security

- The communication between the client and the DCIM shall besecured via a Secure Sockets Layer (SSL) 168-bit Triple-DES (Data Encryption Standard) encoded connection.
- The DCIM shall have Open Lightweight Directory AccessProtocol and Active Directory support.
- The log in to the user interface of DCIM shall use Secure Socket Layer (SSL) or Secure Socket Handling (SSH) authenticate. The web launch to devices shall occur through a HTTP or HTTPSconnection. To increase security, the HTTP or HTTPS connection and the HTTP or HTTPS portshall be user configurable for each device, through the DCIM user Interface.
- The DCIM shall allow the user to create user accounts ranging from Administrator Access to ViewOnly Access. The DCIM shall have no specified limit to the number of user accounts that can be created. Each of these accounts shall have their own unique login user name and password. Anadministrator shall have full read/write access to all the DCIM's functionality. The "View Only Access" users shall only have access, limited to viewing specific groups or devices within those groups, as well as creating graphing trending reports as well as exporting

device data reports. The “Read Only” access user shall not be allowed to change the DCIM configuration or device configurations.

- The DCIM shall have the ability to communicate SNMPv1 or SNMPv3 to monitored/managed devices.

192. Environment Monitoring System

- The environmental monitoring solution shall protect computing equipment from physical threats such as high water leakage, temperature, humidity, smoke, both malicious and unintentional access events
- Water Leak covering all potential areas of water leakages in Server, UPS and Telco Rooms & supporting automatic control of isolation valves/water supply in case of leak detection
- EMS shall have infrared temperature and humidity sensors
- The EMS system shall integrate with racks and Data Center monitoring software for easy deployment, configuration, and management
- The system shall prevent equipment failure from a full range of threatening environmental conditions
- The system shall provide Real-time event notification that minimizes response times to critical physical infrastructure situations. Enables IT Administrators to reduce mean time to repair, improve efficiency, and maximize uptime
- Shall be able to customize threshold definitions (multiple thresholds per sensor, scheduling, severity levels) to requirements
- Shall be able to View the user interface with a browser. Provides quick access from anywhere on a secure network
- User-selectable password with strong password rules and reset password mechanism
- The central device shall i Voltage and relay output, SNMP port and RS485 for monitoring
- The unit shall have console port and USB port for configuration

193. Fire Detection & Suppression System

- Fire Detection & Suppression System along with VESDA complied with requirements of NFPA 72/NFPA 75/ NFPA 2001, UL, EN 54 or Equivalent Standard
- Supply of UL listed and FM approved Automatic Novec1230 based Clean Agent Fire Suppression System @ 4.55% Design Concentration including piping, cylinders, controls, clean agent gas etc.
- Personal Protective Equipment: Gas Mask, Gloves, Gum boots, Sledge hammer, flash lights, soft mask)
- Portable Fire Extinguishers /Cylinders at designated locations of complete first floor
- Complete fire/ flame resistant paint on walls, roof as per EN-13501-1, EN 9001/2008
- Distributor shall be trained by the manufacturer to design, install, test and maintain the fire-

alarm / -suppression system and shall be able to produce a certificate stating such on request.

- Intelligent Fire Detection & Aspiration/VESDA System

(xxix) Addressable Fire Alarm Control Panel.

The Supplier shall provide an addressable, Intelligence Fire Alarm Control Panel and fire-alarm / suppression system to perform the following operations:

- Fire-alarm-, supervisory-, and trouble-event initiation.
- Occupant notification.
- Event annunciation.
- Local control functions.
- Fire-extinguishing-system release, and
- Off-premises transmission.

An advanced, cutting-edge, intelligent digital peer-to-peer modular suppression control system is required. This system should be well-suited for applications related to life safety and property protection, catering to both commercial and industrial settings. It should boast a high degree of programmability, enabling rapid data relay and the efficient execution of various process management tasks, including HVAC shutdown.

The control panel should come equipped with two Signaling Line Circuits (SLC), each capable of supporting up to 254 devices. Furthermore, it should be expandable to accommodate four loops, ultimately providing the potential for a total panel capacity exceeding 1000 devices

(xxx) Addressable Multi Detector.

Intelligent photoelectric/heat, spot-type smoke sensors should incorporate sensing chambers that leverage the principle of light scattering to detect smoke. These sensors should also be furnished with dual thermistors to enable heat sensing. The design of the sensing chamber should incorporate features that reduce the impact of settled dust on sensor performance.
Furthermore, these sensors should feature tri-color LEDs that serve as indicators of the detector's status. The detector can be programmed to display LEDs in a blinking pattern or as steady green, amber, or red lights.

(xxxi) Sounder / Horn Strobe.

The Selectable Candela Evacuation Signals consist of low-profile devices, including horns, strobes, or horn/strobe combinations, designed to provide reliable audible and visual alarms while consuming the least amount of current. The Selectable Candela Evacuation Strobe Horn/Strobe at 24VDC is capable of offering field-selectable candela options, allowing choices of 15, 30, 60, 75, and 110 candela. For the 12VDC model, it provides selectable candela options of 15, 30, 60, and 75 candela. Selectable Candela EvacuationSignals should have a minimal operation current and a minimum flash rate of 1Hz regardless of input voltage.

(xxxii) Manual Call Point.

Intelligent Manual Pull Station should be a state-of-the-art, dual-action (i.e., requires two motions to activate the station) pull station that should include an addressable interface (mounted inside) for fire alarm control panels. Because the pull station is addressable, the control panel should display the exact location of the activated device.That could lead fire service personnel quickly to the location of the alarm. The isolator should provide complete short circuit isolation as per NFPA 72, Style 7 wiring.

(xxxiii) VESDA.

VESDA smoke detectors incorporate cutting-edge detection technology, offering exceptionally early warning and superior nuisance alarm rejection for a diverse array of applications. These detectors are founded on Flair detection technology, and the manufacturer boasts extensive application experience, ensuring that the detectors consistently deliver high performance throughout their operational lifespan through absolute calibration

Configuration

- Every Room will be considered a separate zone.
- In a Zone Room Void / Ceiling Void / Floor Void detectors will be considered.
- Gas will not be released on 1st detector activation 1st alarm.
- Two detector activation will be required in a zone for gas release / discharge.
- Gas will not be released on 1st alarm even if the panel received multiple 1st alarms from different zones.
- HVAC units will be shut down on 1st alarm.
- All doors will be opened on 1st alarm with the help of an access control system.
- Gas will not be discharged on the VESDA alarm due to the sensitivity of the alarm.
- Email intimation can be received with the help of software.
- All devices can be monitored on precise vision software.

(xxxiv) NOVEC1230 Fire Suppression Gas System.

M200 fire protection fluid extinguishes a fire by heat absorption. The gaseous mixturecreated when fluid discharges into air has a much higher heat capacity than air alone. The gaseous mixture absorbs large amounts of heat due to the high heat capacity andextinguishes fires by sufficiently cooling the combustion zone. It is important to note,NOVEC1230 fluid does not use the depletion or displacement of oxygen to extinguish a fire and therefore is safe for occupied spaces.

- Novec1230 cylinder and valve assembly.
- NOVEC1230 shall be stored in engineered cylinders.
- Low & Discharge pressure switches shall be provided on cylinders
- NOVEC1230 cylinders shall be provided with the rupture disc.
- NOVEC1230 discharge nozzles will be made of brass or stainless steel.
- Cylinder size and nozzles size shall be according to the software generatedcalculations.

(xxxv) Portable Fire Extinguisher.

- CO2 5-kg cylinder shall be used for data center facility.
- DCP-6kg shall be used for general areas.
- LPCB Approved Fire Extinguishers shall be used.

194. Electrical components

195. Incoming Main Transformer:

The Power to the Data Center will be supplied with 02 Transformers for path A and B

Supply Installation, testing and commissioning of 400 kVA dry type Cast Resin transformers with enclosure for each path (A& B) as per following specs;

- Winding type : Copper.
- Core insulation : Cast resin vacuum casting
- Vector group : Dyn11
- Primary Voltage : 11Kv.
- Secondary Voltage : 415 V phase to phase.
- Frequency : 50 Hertz
- Impedance : 6%
- No Load Losses : 1650Watts
- Load Losses : 7600Watts
- HT Tapping range : ±5%
- Rated short time power frequency withstand voltage : 30Kv (RMS Peak)
- Rated lightening Impulse withstand voltage : 75Kv. (RMS Peak)
- The transformer shall be supplied with outdoor enclosure of IP65 rating.
- The applicable standard for dry type transformers is IEC 60076.

Following Test reports shall also be provided.

- Measurement of insulation resistance
- Measurement of winding resistance
- Measurement of voltage ratio and check of phase displacement
- Measurement of short-circuit impedance and load loss
- Measurement of no-load loss and current
- Separate-source AC withstand voltage test
- Induced AC withstand voltage test
- Partial discharge measurement
- Lightning impulse test
- Temperature-rise test
- Measurement of sound level

196. Generator

Output Ratings

- Genset Prime Power Rating 400KVA

Make/Assembler

- International renowned original brand/Manufacturer only. Supply and the manufacturing of Generators should be the same country as the original/actual OEM established in country of origin. No third party/country OEM is allowed in any case. Import documents will be required during the inspection.

Diesel Engine make

- Factory should be established and manufacturing engines over 40 years
- Brushless Single Bearing
- Aspiration: Turbocharged Air-to-Air After cooled

Alternator

- ~~Leroy Sommer, Caterpillar or Equivalent~~
- With respect to synchronous alternators designed to comply with the following standard: DECLARATION OF CONFORMITY
    - ENA EREC G99 standard application form from 27 April 2019
    - ENA EREC G5 Issue 4 standard application form from March 2001.
- Origin: UK, USA or Equivalent

Technical Data

Base Frame Type: Heavy Duty Fabricated Steel with Engine and alternator mounting on flexible rubber on a vibration absorbing steel frame

- Circuit Breaker Type: 3 Pole MCCB/ ACB Temperature 50°C
- Insulation Class: H
- Protection Class: IP 21
- Excitation System: Self Excited Brushless
- Starting System of Engine: SLI/Sealed Battery & Charging System
- Frequency: 50 Hz
- Engine Speed: 1500 RPM
- Built-in Fuel Tank Capacity: Should have 08-Hours continuous running
- Engine: 6 cylinder turbo charged, water cooled.
- Governor Type: Electronic.
- Performance Class: Must be G3 and verification required.
- Frequency: 50Hertz.
- Battery and starting system: 24V DC.
- Exciter type: Permanent Magnet (Rotary Type).
- Excitation Method: Shunt Excited.
- Circuit Breaker Type: MCCB/ACB, 3/4 Pole.
- Alternator: Single bearing synchronous type.

- The Electronic module should be either ”Deep Sea” or equivalent with all necessary protection of the Engine feature like speed, engine oil temperature, coolant temperature ,battery condition etc.

- Generators need to be set up in a parallel configuration, and the controller must oversee the scheduling between two generators to ensure an equitable distribution of operating hours.

- Canopy Type (Supplied by the OEM): The weather proof sound proof canopy shall be fabricated from 14 SWG galvanized steel sheets. After fabrication the canopy shall be powder painted at more than 75 microns. The canopy shall be supplied with the lifting and jacking arrangement. The door should be positioned in such a way that they provide no hindrance during routine maintenance of the D.G set. The canopy shall be provided with residential type silencer capable of reducing sound level up to 75db at one meter distance from the enclosure.

(xxxvi) Scope

The work under this section consists of supply, installation, testing and commissioning of all material and services of the complete Diesel generator set including Auto Main Failure (AMF) Panel and other equipment as specified.

General

- The Diesel generator set shall be a standard design of reputed manufacturer, who shall have similar units in operations for similar applications and field conditions. The manufacturer shall also have adequate maintenance facilities in the vicinity of Project with technically qualified and experienced personnel trained for operation and on-site maintenance of equipment offered by the Supplier in the tender bid.

- The engine shall be directly coupled to the generator, and shall have a rated speed of 1500 rpm. The set shall be capable of sustaining without damage, 25% over speed under any abnormal operating condition.

- The engine-generator set shall be mounted on suitable rigid steel frame skid with vibration isolators. Heavy duty lifting eyes and jacking screws shall be provided on the skid. The foundation bolts and all other material/hardware for complete installation of the set shall be furnished with the set. Any excessive torsional vibration shall be avoided for both engine and alternator.

- The set shall be suitable for full load starting. When the generator is operating at no-load, the application of full load current, taking into account the surge due to starting of equipment, should be possible with maximum transient voltage drop of 15% of the rated voltage, and the time taken to restore the generator voltage to 97% of rated value should not exceed 1.5 seconds.

- The set shall be capable for parallel operation.

- The Supplier shall submit the equipment layout and other installation details as per manufacturer’s recommendations for approval of PURCHASER.

- Necessary provision, including connections and a Local / OFF / Remote control switch shall be made in the Generator Panel of each of the D.G. Set. The cost of such provision, connection, testing and commissioning are deemed to be included in the Cost of D.G. Sets and no separate payment shall be made against such works.

Applicable Standards & Codes

The Diesel engine and generator shall conform to the following standards as applicable.

BS 5514 - Reciprocating Internal Combustion Engine.

BS 4999 - General Requirements for Rotating Electrical Machines.

BS 5000-99 - Rotating Electrical Machines of particular types.

For other equipment and materials related to the Diesel generator set, the Supplier shall follow relevant international standards, details of which shall be submitted to PURCHASER for approval.

Diesel Engine

- The Diesel Engine shall be four strokes, compression ignition, suitable for continuous duty.
- Starting shall be through electric starter motor operated on DC supply from lead acid batteries mounted on the skid. The batteries shall be furnished with the set.
- The engine shall be equipped with an alternator type automatic charging system to charge the batteries during running of engine. A static battery charger installed in the control panel shall also be provided to charge the batteries when the engine is not running. Suitable interlocks shall be provided to prevent simultaneous operation of both charging systems.
- The batteries shall be adequate to satisfy the following requirements:
    - Crank the engine at firing speed for at least 15 seconds.
    - If the engine does not start on the first attempt, crank the engine two more times for the above duration at an interval of 30 seconds between each cranking operation.
- Engine shall be rated for continuous duty with overload capability for operating at least 10% above the rated capacity for 1 hour continuously in any 12 hours operation.

Air Intake

- Air intake shall be through turbo charger and equipped with dry type filter. Suitable attenuators shall be installed to reduce noise at the air inlet.

Engine Lubrication

- A gear type positive pressure lubrication pump shall be provided with efficient filtration arrangement for the lubrication system. A 230V AC mains operated heater with thermostat shall be provided in the crankcase.
- The heater shall be designed for automatic switching to ensure that temperature of oil is maintained for proper operation of the engine.
- Engine shall have a constant oil level regulator, gravity fed from an engine mounted lube oil reservoir. Reservoir shall be equipped with an oil level gauge. Size of the reservoir should be suitable for 30 days continuous operation at full load.
- A crankcase pressure release valve shall be provided to operate during excess pressure.

Engine Cooling

- Engine shall have a forced air draft, water-cooled radiator supplied with a core guard. Cooling system shall have an engine driven centrifugal pump for cooling water circulation. Cooling shall be thermostatically controlled. An engine shut down timer shall be provided to keep the engine running on no-load after any operation of set, so that the engine is sufficiently cooled to start again instantly, if required, without rise in temperature above safe limits.

Exhaust System, Noise, Pollution

- Exhaust system shall be equipped with a residential type silencer complete with muffler, exhaust manifold, flexible connector, exhaust elbow, exhaust pipe, rain cap, and associated fittings. The exhaust line shall be taken outside the building through the shortest possible and practical route, without any undue bends. This exhaust line shall be adequately covered with thermal insulation material over its entire length i.e. from the engine to the termination point. All supports for exhaust system shall be furnished.

- The sound level in the diesel generator room shall not exceed the values of the noise rating curve NRC 95 to ISO TI 43-1961 standard, measured at 1 m distance from the object but in no case greater than 85 dB (A) under all operating conditions.

- The exhaust fumes shall be burnt completely and be free of solid matters before escaping to the air.

Speed Governor

- The speed governor shall be electronic type. Governor shall regulate engine speed so as to maintain the generator frequency within plus or minus 2% of the rated frequency. Stable engine speed shall be attained within 15 seconds after the engine has been started. Stable engine speed shall be restored within 10 seconds of any sudden change in load, from no load to full load. During this change of load or surge, the speed shall not vary by more than plus or minus 5% of the rated speed.

Fuel System

- Engine of the generator shall operate on commercial high speed Diesel oil. A fuel oil strainer/filter shall be provided in the fuel line. Fuel system for Diesel engine shall be complete in all respect

Fuel Storage Tank

- Supply installation testing and commissioning of fuel tank for the storage of enough fuel for the consumption D.G Set for 48hour operations. The height of fuel tank shall be suitable for the flow of fuel under gravity.

- The fuel tank shall be fabricated from 14SWG sheet steel. After fabrication the tank shall be cleaned and degreased before power painting. The powder paint thickness on the tank shall not be less than 75microns. A clear glass tube shall be installed on the side of the fuel tank to show the level of fuel inside the tank.

- The level marking calibrated in liters shall be marked on the tank behind the glass tube.

- The tank shall have high and low level float switches for monitoring the fuel level in the tank. The high and low level switches shall provide an annunciation while the low level switch shall in addition to above annunciation also prevent starting of set and to stop the set when the fuel in storage tank is at this level. The tank shall be provided with overflow, vent, supply and discharge valves, inspection cover, drain valve and glass sight gauge.

- The fuel storage tank shall be of mild steel plates and shall be designed, fabricated and finished in accordance with the requirements of DIN 6608.

- Tank shall be capable to withstand maximum loads encountered during installation and operation for all conditions from empty tank to tank filled to capacity or overflow.

- Tank shall be in accordance with the relevant BOCA or UBC code requirement for seismic load whichever is more stringent.
- Tanks shall be capable to withstand safely the forces and moments imposed by connecting piping.
- The thickness of tank elements shall be increased over the thickness required by code requirements by 2mm for corrosion allowances.
- The tanks shall be of welded construction in compliance with specified DIN standard and/or section VIII of the ASME code, DIV I.
- The tanks shall be provided with at least two lifting eyes. Shell plate joints shall be butt welded with complete penetration and fusion. All joints in the attachments to the shell shall be fully seal welded to prevent rust staining.
- Sharp welds and sharp corners shall be ground smooth and blended into the base material. All bottoms of the shell connections shall be flush with the inside of the shell unless otherwise indicated.
- The interior surfaces of the tank shall be cleaned of all mill scale, cuttings, weld spatter and other foreign matter and shall receive a commercial sandblast in accordance with SSPC-SP 5.
- The exterior surfaces of all tank and piping shall be given a protective coating of the epoxy-phenolic-amine type.
- All interconnecting steel pipes shall be seamless in accordance with ASTM-A 53 or approved equivalent. Pipefittings shall be butt-welded type according with ASTM-A 53. All underground pipe and fittings shall be buried in accordance with ASTM D 1557. The pipe surface shall be given a protective coating of the epoxy-phenolic-amine type.

Fuel Day Tank

The engine generator skid mounted fuel day tank for each D.G. Set shall have capacity to store fuel for 8 hours operation of the set at the rated output. The tank shall have level switch for monitoring low fuel level in the tank. The low level switch shall provide an annunciation and prevent starting of set and to stop the set when the fuel in storage tank is at this level. The tank shall be provided with overflow, vent, supply and discharge valves, inspection cover, drain valve and glass sight gauge.

Generator

Generator shall be synchronous. The generator shall be capable of carrying continuously for 1 hour in every 12 hours, overload equal to 10% of rated output with field set for normal rated load excitation.

Excitation

Excitation shall be from brushless rotating diodes mounted on the main shaft for 3-phase full wave rectification.

Windings

Alternator windings shall have Class-F insulation and shall be impregnated for tropical use. The temperature rise of winding under normal operating conditions and at rated load shall not exceed the limits specified for Class-B insulation. Anti-condensate heaters shall be provided for windings. The heaters shall be thermostatically controlled for switching ON after the set has stopped. The thermostat range shall be adjustable and set to prevent overheating of windings.

For protection of windings from damage due to overheating, thermistors shall be embedded to stop the set in case the temperature of winding rises above the safe value.

Voltage Regulation

- Voltage regulator shall be solid state with provision for manual setting. Regulator shall be so designed to protect the exciter when the set is running at reduced speed during starting or idling of the prime mover.

- Voltage regulation shall be plus or minus 2.5% from no-load to full load. Transient voltage drop shall be less than 15% at full load and 0.8 power factor. Time required to restore to steady state conditions after transient voltage fluctuation shall not exceed 10 seconds.

Short Circuit Capability

Generator shall be capable of withstanding without injury, a 30 seconds three-phase short circuit at its terminal when operating at rated output and power factor with fixed excitation.

Deviation Factor

The deviation factor of the open-circuit line-to-line terminal voltage shall not exceed 0.1

Control / Instrument Panels

The Control / Instrument Panel for each generator shall be designed for front access, completely assembled, wired and tested. The control panel shall conform to the constructional requirements as stated in these specifications for Switchboards. The panel shall comprise but not limited to the following main components.

Generator Panel

This shall incorporate protection and control equipment, measuring instruments, control and instrument transformers, voltage regulator, governor controls, battery charger, indicating lamps, etc.

Circuit Breaker

- The circuit breaker shall be triple pole with adjustable releases for thermal overload, instantaneous over current, under voltage and over voltage protections.

Instruments

- Ammeter with selector switch.
- Voltmeter with selector switch.
- Frequency meter.
- Kilowatt-hour meter.
- Ammeter for battery charging current.
- Kilowatt-meter.
- Local / OFF / Remote Control Switch.

Engine Panel

An instrument panel on the skid shall have calibrated gauges/meters to measure the following:

- Engine speed
- Lube oil pressure
- Lube oil temperature
- Engine water temperature
- Engine running hours

Safety Devices

Following safety devices shall be provided. The audible alarm shall operate on any fault condition and shall be resettable manually and automatically through a timer after 15 minutes whichever is earlier:

A = Alarm SD = Shutdown TD = Adjustable Time Delay

Engine Over speed	A/SD
Low lube oil pressure	A/SD
High water temperature	A/SD
Over voltage	A SD (TD=0-30 Sec)
Under voltage	A
Short circuit and tripping of circuit breaker	A SD (TD=0-1 min.)
Low level in fuel day tank	A SD (TD=0-5 min.)
High level in fuel day tank	A
Charger failure	A
Winding temperature high	A SD (TD=0-2 min.)
Over crank	A SD
Low crankcase oil level	A
High crankcase oil level	A
Charging alternator failure	A

After shut down, the set shall lockout and it shall not be possible to start it unless manually reset after the cause of fault has been removed.

ATS/AMS Panel:
The ATS/ AMF panel shall incorporate automatic changeover system, which shall be designed for the following functions:

- To start the sets immediately when the main supply fails.
- ATS/AMS Panel should be installed with Automatic Phase reversal protection panel.
- To start the set and synchronize whenever the main supply voltage drops to 360 volts or rise to 440 volts. The setting voltages shall be adjustable within - 5% and +5% respectively for the lower and upper ranges.
- To make two successive attempts, in case the set fails to start in the first attempt.
- Initiate the Automatic Transfer Switch (ATS) closing the Generator Air Circuit Breaker while the Supply Air Circuit is already made open. The ATS shall transfer the load to the Generators. The system shall provide for immediate transfer of load to the generator, after the rated speed/frequency and voltage have been achieved.
- The load sharing between the two generators based on percentage adjustable load sharing.
- The system shall transfer the load from the generator to main supply wherever the voltage returns +5% and persists for at least 3 minutes.
- The system shall be self-resetting after each cycle of operation.

A four-position selector switch shall be provided for selecting the operation mode i.e. Test-Manual-Automatic-Stop/Maintenance mode to facilitate the operation.

ATS (Auto Transfer Switch Panel):
Separate ATS Panel for each path with IP33 compliant. Panel shall have integral segregation of Form 2 with phase indication lights and digital volt/ampere meter for Genset and IESCO ACB's and MCCB's and all the control equipment including magnetic contactor, relays and timers.

- Structural material should be hot dip galvanized
- Equal rating surge protection device

- Independent bypass panel for each ATS panel having adjustable MCCB's of suitable rating with mechanical interlocking
- Auto load switching between both Genset on each ATS panel
- ATS should be integrated with DCIM

Installation & Testing

- All installation materials for physically installing the Diesel generator set and associated equipment, such as bolts, nuts, washers, supporting steel, etc., shall be provided and installed by the Supplier. The generator shall be installed upright and in level and shall be firmly and rigidly bolted to the steel frame skid with vibration isolators.
- The Diesel generator set shall be completely erected as per manufacturer's instructions and all civil work required for the installation should be according to the manufacturer's specification. Loose parts dispatched by the manufacturer shall be installed and connected as per assembly drawing provided by the manufacturer. Any safety locking of meter, relays, etc., provided by the manufacturer for safe transport shall be released only after the generator/ control panel is erected in position.
- The incoming and outgoing cables shall be connected as recommended by cable manufacturer. The cable armor shall be connected effectively to ground.
- The Diesel generator and associated equipment body shall be connected to earth as per instructions given in section "Grounding" of these Specifications. The Diesel generator set shall be tested as per the instructions of Engineer and commissioned in the presence of PURCHASER.
- The load testing to prove the Prime Rating of the D.G Set should be as following sequence; commissioning Test:
    - 25% of full load 2 hrs.
    - 50% of full load 5 hrs.
    - 75% of full load 8 hrs.
    - 100% of full load 8 hrs.
    - 110% of full load 1 hr.
- The tank shall be installed in accordance with best engineering practice/international codes, the approved shop drawings, applicable code requirements and manufacturer's instructions.
- The piping shall be hydrostatically shop tested as required by ASME code, section VIII, DIV-I and will be dried immediately after the test.

197. LT Distribution Boards

Scope of Work

The work under this section consists of supplying, installing, testing, and commissioning of all material and services of the complete Low Tension (LT) Distribution Boards.

General

The Low Tension Distribution Board (DB) shall be sheet steel fabricated suitable for surface/recessed mounting on wall or floor standing totally enclosed, dust tight and vermin proof. It shall be complete in all respect with material and accessories, factory assembled, tested and finished according to the Specifications and to the normal requirements. The LT Distribution Board shall have protection class IP-42 for indoor installation, class IP-54 for indoor damp areas and class IP-65 for outdoor area.

The Low Tension Distribution Board shall be front operation type and shall:

- Have a rated service short circuit breaking capacity (Ics), conforming to IEC 60947-2 and provided with adequate clearance from live parts so that the flashovers cannot be caused by switching, vermin, pests etc.
- Suitable for 400 Volts, 3 phase 4 wire, 50 Hz system.
- Designed for flush mounting of all instruments on the front side.
- Have incoming and outgoing cable termination arrangement, terminal block/line up terminals.
- Provided with stainless steel name plate on the front side of door.
- Have all incoming and outgoing connections from top or bottom as per requirement of site conditions.
- Have door grounded by flexible copper strip/cable.
- have wiring diagram in the pocket inside the door of Distribution Board

Applicable Standards/Codes

The latest editions of the following standards and codes shall be applicable for the materials specified within the scope for this section:

IEC 60051	-	Direct setting electrical measuring instruments
IEC 60073	-	Colors for indicator lights and push buttons
IEC 60947-2	-	Low voltage switchgear and control gear
IEC 60439	-	Low Voltage Switchgear and Control gear Assemblies.
BS 4752	-	Circuit Breaker
BS 3871	-	Miniature & Molded Case Circuit Breakers
BS 88	-	HRC fuses
BS 89/90	-	Ammeters and Voltmeters
BS 3938	-	Low voltage current transformers
BS 1432	-	Bus Bars

Sheet Metal Work

- The Low Tension Distribution Board (DB) shall be fabricated with 16 SWG sheet steel recess / surface mounting as approved by PURCHASER. All the components shall be

installed on a common component mounting plate inside the enclosure and protected from the front with screwed sheet steel front plate. The enclosure shall be provided with rubber gasketting and a lockable hinged door with cam fastener.

- The distribution board shall be supplied complete with all installation materials as recommended by the manufacturer. The incoming and outgoing cable connections shall be according to the wiring requirements. If required, an adapter box for accommodating the cables and conduits may be provided. The box shall be of the same material and finish as the DB. All holes, cutout etc. shall be tool and free from burrs and rough edges.
- The cabling inside the DB shall be suitably harnessed by means of straps or cords. Color sleeves shall be provided on each cable lugs connected to the bus bars, circuit breakers or terminals for phase identification. An earth bar shall be provided for connection of incoming and outgoing earth conductors. The earth bar shall be permanently connected to the body of DB at two points. Flexible copper strip shall be provided for Grounding of the door of DB.
- Circuit numbers/ designation on all circuits shall be conspicuously marked to facilitate connection and maintenance.
- All metal work of the DB shall be cleaned down to bare shining metal phosphated and the surfaces chemically prepared for powder coating. Then these shall be coated with powder of color RAL 7032 and then baked in oven. The thickness of powder coating shall not be less than 120 microns.

Components

The Low Tension Distribution Boards (DB) shall be provided with components as specified, as shown on the Bidding Drawings and required for the satisfactory operation of the distribution board and of the electrical system.

Typical component specifications are given below:

Bus Bars

- The Bus bars shall be made of 99.99% pure high conductivity electrolytic tinned copper and shall be completely isolated and mechanically braced for the specified fault level. The identification of bus bars shall be by providing colors sleeves on bus bar ends and these shall be red, yellow and blue for phases and black for neutral. The earth bus bar shall be green.
- The bus bars shall be for three phase, neutral and earth and shall be of appropriate size to meet the electrical and mechanical requirements of the system. The temperature rise shall not exceed 30oC at rated current.

Molded Case Circuit Breaker (MCCB)

- The MCCBs shall be molded case triple pole 440 Volts or single/double pole 250 Volts of current ratings. These shall have fixed magnetic short circuit and adjustable/fixed thermal overload protection.
- Under voltage and shunt trip etc. shall also be provided when so required for safe operation and interlock.

- The MCCBs shall be installed such that their switching levers are accessible through the front plate for operation.
- The single and triple pole MCCBs shall have short circuit rupturing capacity suitable for the distribution system as approved by PURCHASER. The MCCBs shall be suitable for working on lighting and power circuits.

ACB's

- Air circuit breaker is to prevent re-establishment of arcing after current zero where the contact gap will withstand the system recovery voltage.
- During interruption of arc, it should create an arc voltage instead of supply voltage. Arc voltage is defined as the minimum voltage required for maintaining arc.
- The microprocessor based Relay shall be capable of withstanding short circuit equal to seventeen times the rated thermal current
- The microprocessor based Relay incomer ACB should have built in single phasing protection and phase unbalance protection as per IEC947-4.
- The ACB's shall be Three-position draw out type. Any attempt to with draw the Air Circuit Breaker, which the unit is in service, will automatically trip the breaker. It shall be possible to rack the ACB main contacts in to disconnected position with the door closed.
- Remote electrical indication of the circuit breaker status should be possible for all the positions.
- The ACB shall have Minimum Service Breaking Capacity (Ics) equal to Ultimate Breaking Capacity (Icu).
- Trip history feature shall be available.

Ammeters and Voltmeters

All meters shall be flush mounting, moving iron, spring controlled. The front dimensions shall be 96 x 96 mm for meters.

The meters shall be of accuracy class 1.5 according to BS-89 and 90. The ammeter shall be suitable for connection to 5 Amps secondary of current transformers or directly through shunt as shown on drawings. The ammeters and voltmeters shall have measuring range as indicated on the drawings.

Current Transformers

Air cooled, ring type current transformers shall be provided having transformation ratio as indicated on the drawings. The current transformers shall be of suitable burden having accuracy class 1.0 according to BS 3938. The current transformers shall have 5 amps secondary.

Selector Switches

The ammeter and voltmeter selector switches shall be complete with front plate, grip handle, R-Y-B and OFF position for ammeters and RY-YB-BR-RN-YN-BN and OFF position for voltmeters shall be marked on the respective selector switches.

Air Break Contactors

The contactors shall be air break, triple pole 400 VAC type and suitable for the type of duty (at least utilization Category AC3) to be performed. The main contacts shall be silver tipped, butt type with double break per pole. Each contactor shall be provided with single phase 230 VAC operating coil and minimum one spare normally open and one normally closed auxiliary contact. The number of working auxiliary contacts shall be provided according to the system requirements.

Push Buttons

The push buttons shall be illuminated, momentary make/break contact type or latch type (push-on/push-off) as required and approved by PURCHASER and suitable for flush mounting. The push button for ON and OFF switching shall be red and green respectively. They shall be provided as shown on the drawing.

Indicating Lamps

Indicating lamps shall be LED type suitable for flush mounting, complete with base. They shall be suitable for operation on 230 V AC and it shall have rosettes of suitable colors as approved by PURCHASER. These shall be provided for R, Y, B phases on each distribution board.

Impulse Relay

Impulse Relay shall be 1 or 2 pole, 250 V rated and be provided with latching mechanism.

Line up Terminals

Line up terminals wherever provided for control or power circuits shall be suitable for voltage and size of conductors as indicated on drawing.

The line-up terminals for controls shall be suitable for channel mounting. All necessary accessories such as end plates, fixing clips, transparent label holder caps and label sheets with marking shall be provided.

Power Factor Improvement

Provision of indoor type Automatic Power factor Improvement Panel to be installed adjacent to Main Panel distribution panel consisting of capacitors make, suitable for 440 Volts, HRC fuses, bases and links, 12 steps automatic reactive relay digital type, “ON” indication lights, power factor meter, push buttons, auxiliary contactors, Hand - Off - Auto switch, discharging chokes, all other necessary materials.

Installation

The location of low tension distribution boards (DB) are shown diagramatically on the drawings. The actual location shall be determined at site, keeping in view the site conditions and in co-ordination with other equipment, as approved by PURCHASER.

Low tension distribution board for recessed mounting in wall shall be installed such that the door shall finish flush with the surface of wall. The recess mounted distribution board shall be installed before the plastering of walls. The DB shall be protected to avoid any damage due to the civil work. Any cuttings, dismantling of the existing wall required for fixing the DB shall be coordinated at site with the approval of the Engineer. Any damage done to civil structure shall be made good by the Supplier.

All loose parts dispatched separately with the DB shall be installed as per manufacturer instructions and all adjustments or settings shall be made as required. All screws, nuts and bolts used for fixing the distribution board shall be galvanized.

The distribution boards' installation shall include connecting all incoming and outgoing cables. The cable entry in the boards shall be provided from top or bottom as required and/or as approved by PURCHASER.

Note:

a) For ATS Panels ACB rating = 1000A F.P (Draw out type).
b) For Data Centre Main UPS the MCCB rating = 320 A F.P.
c) For Facility UPS the MCCB rating = 200A F.P.
d) For Air-Conditioning Loads the MCCB rating = 320A F.P.
e) For Facility load (Non UPS) MCCB = 75A F.P

All the LT Panels and Switchboards shall be Type Tested.

198. Bus Way Trunking distribution

Installation, testing and commissioning of triple pole + neutral insulated busway trunking distribution as per approved SLD, made of electrolytic copper 99.9%, housed in aluminum casing which act as an earth having louvers at sides, wire mesh, all other accessories required like tees, bends, right angle bends. ASTA and KEMA accredited laboratories to ensure the products supplied meet the international requirement

Ingress protection ratings should available IP55 for Indoor and IP68 CAST Resin for outdoor. Configuration shall be TP/N as 100% Phase and 100% Neutral.

Manufactured in accordance with IEC61439-1 and IEC61439-6. Type Tests 10.2.2 Resistance to Corrosion, 10.2.3.2 Resistance to Abnormal Heat and Fire Due to Internal Electric Effects, 10.2.4 Resistance to Ultraviolet (UV) Radiation.

Seismic Compliance shall have a qualification level - high (Zone-4&5) in accordance to IEEE standard 693-2005.60068-2-3 (Damp Heat Cyclic) and UL Classified E+I Engineering completed extensive testing at UL accredited laboratories to ensure the products supplied meet UL requirements.

The Bidder shall measure the BTD's actual length at the site before its fabrication. The BTD should be installed on the Low-Tension (L.T) side of the Transformer, Gensets, Main Distribution Panel, and Precision Cooling Units.

- In this project the BTD will be used between the transformer LT side up to the LT panels, generators and LT panels.
- The transformers and the D.G Sets are placed on ground floor over the roof of upper basement.
- The LT panels will be installed at first floor. The Supplier is required to Install the BTD at the outdoor and bring it up to the LT panels installed at first floor.
- All the necessary components such as through joints bends and tap off boxes to be installed at site according to the site condition.
- The Supplier will provide the protective weather proof enclosure for the BTD installed at the outside the building.

- The conductor of the bus bars is tin coated Aluminum / Copper.

Testing:
To confirm the integrity of the insulation system, each component of the BTD shall be tested. This test shall be performed at two times rated voltage plus 1000 Vac (2200 Vac).
Every length and fitting of busway must also pass a 7500 Vdc hi-pot test before shipment from the factory.
Every length and fitting of our busway must also pass a 7500 Vdc hi-pot test before shipment from the factory. This additional test helps ensure the highest quality busway possible

199. Low Tension Cables and Wires

Supply installation testing and commissioning of LT Cables and wires as per the size the requirements as mentioned in the drawings.
The general specifications are as under;
General
All multi-core and single core PVC insulated and sheathed cables for light circuits, socket outlets and circuits operating up to 250 volts shall be 300/500 volts grade. All single core PVC insulated, non-sheathed cables shall be of 450/750-volt grade. Power cables for main feeders, main to sub main feeders, power equipment, etc., armored or unarmored shall be of 600/1000 volt grade. Armoring of multi-core/ single core cables shall be done with appropriate size galvanized steel/aluminum wire as per relevant codes.

Applicable Standards/Codes

The latest editions of the following standards and codes shall be applicable for the materials specified within the scope of this section:

- BS 6004 - Electric cables PVC insulated, non-armored cables for voltages upto and including 450/750 volts for electric power, lighting and internal wiring
- BS 6346 - Electric cables PVC insulated, armored cables for voltages of 600/1000 V and 1900/3300 V
- BS 6746 - PVC insulation for electrical cables
- BS 6360 - Copper conductors
- BS 6500 - Insulated flexible cords
- BS 7846 - Electric cables 600/1000 V armored fire resistant cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire
- BS 7889 - Electric cables. Thermosetting insulated, unarmored cables for a voltage of 600/1000 V
- BS EN 50266 - Common test method for cables under fire conditions.

200. EPO (Emergency Power off)

- Emergency Power-Off (EPO) System consists of one or more wall-mounted push-button EPO boxes.
- EPO should also be able to disconnect UPS Batteries.
- Each EPO box should provide a single point of equipment shutdown for minimum 6 devices including third party device.
- EPO box can be cascaded with other EPO boxes to support multiple points of equipment shutdown

201. Grounding / Earthing

Supply installation testing and commissioning of earthling with following specification

- The Grounding system consists of earth electrodes, Grounding leads, earth connecting points, earth continuity conductors and all accessories necessary for the satisfactory operation of the associated electrical system.

Applicable Standards / Codes

The latest editions of following standards / codes shall be applicable for the materials specified within the scope of this section:

- BS 7430 - Code of practice for Grounding
- BS 951 - Electrical Grounding. Clamps for Grounding and bonding specifications
- BS 6346 - PVC insulated cables

- Drilling of earth bore 3" (75mm) dia 80 to 90 ft. deep or up to permanent water table, back filling, ramming, complete in all respect. Grounding bores shall be made at 10ft. away from foundation and distance between earth bore shall not be less than 10ft.
- Earth Electrode for Grounding shall comprise of 75 mm x 6 mm thick copper plate with 4 Nos of 6 mm dia brass nuts, bolts and washers 70 sq. mm. HDHC Copper wire as Grounding leads. A 100 mm dia Medium Duty GI pipe shall be used with 10 mm dia hole.
- When the drilling is complete, the above mentioned earth electrode shall be drop down to the bottom of the hole with the help of 70 sq. mm. earth leads.
- Once the plate is in place fill in the hole with moisture retaining bentonite slurry with tremie method up to the top. When the bentonite settle down cast a (1:4:8) concrete manhole 700 mm x 700 mm & 500 mm deep.
- The required earth resistance is less than 1 Ohm. If 80 to 90 feet drilling does not meet the specified earth resistance requirement then the Supplier should increase the drilling depth as needed to achieve the specified earth resistance.

(xxxvii) Grounding Material

- **Grounding Lead**
- The Grounding lead shall connect the earth electrode to earth connecting point or equipment in the building. It shall be of stranded electrolytic copper. It can be bare or PVC insulated of size shown on the drawings.

- **Earth Continuity Conductor**
- Earth continuity conductor (ECC) shall be stranded bare copper wire or single core PVC insulated copper conductor cable of sizes indicated on the drawings. All thimbles, lugs, sockets, nuts, washers & other accessories necessary for the complete installation of ECC shall be provided by the Supplier without any extra cost.
- The specifications for single core PVC insulated cables used as ECC shall be same as those given in section "LT Cables" of the technical specifications. PVC insulated cables when used as ECC shall be green or green/yellow.
- **Earth Connecting Point**
- Earth connecting points shall comprise tinned copper bar, rectangular in shape, having dimensions of 300 x 50 x 6 mm. At least six terminals for connection shall be arranged on the bar, which can be increased or decreased as required by PURCHASER.
- The terminals shall have brass or tinned copper bolts, nuts and washers for protection against corrosion. Two holes shall be provided off center of the copper bar for fixing to the wall by means of 10 mm dia. nut and bolt and shall be insulated by means of rubber gaskets/washers.

202. Lightning Arrestor

Active capturing system: Product should be designed to function in accordance with the principle of "Early Streamer Emission (ESE)"

- Any European/US Brand
- 100% of efficacy in discharge capture.
- High level of protection.
- Lightning rod without electrical components.
- Maximum accepted current 200kA.
- Should preserves its initial properties after each discharge.
- Doesn't have replaceable parts
- Doesn't require external power supply.
- Operation guaranteed in any atmospheric condition.
- High resistance to temperature upto: 125ºC.
- High resistance to weather conditions and corrosive atmospheres.
- Maintenance free
- Should be provided with lightning strike counter
- Compliance with NF C 17-102, UNE 21186:2011, IEC 62305 or similar

203. HVAC

204. Scope of Work

This section forms an integral part of each section of HVAC system.

The scope of work covered in this section encompasses the provision of all materials, equipment, and the execution of all tasks required for the comprehensive implementation and finalization, which includes testing and commissioning of all HVAC systems as outlined in the specifications or as directed by PURCHASER.

This encompasses all systems, including the integration of internal systems with external ones. All materials and equipment used must adhere to the specified specifications and should be limited to

products regularly manufactured and recommended by the manufacturers for their intended use. Prior to installation, the Supplier is required to submit samples, necessary catalogs, sketches, the manufacturer's information, and any necessary guarantees for approval by PURCHASER. All materials and equipment must be new and unused.

Furthermore, all other equipment and materials should be installed in strict accordance with the manufacturer's instructions, which are considered an integral part of the specifications.

It is explicitly understood and agreed upon by the Supplier that any material or labor typically provided as part of such equipment, and necessary for its proper completion and optimal functioning, will be included as part of this contract at no additional cost, whether or not detailed on the drawings or explicitly described in the specifications.

The Supplier bears responsibility for their work until its completion and final acceptance, and they are obliged to replace any damaged, lost, or stolen components without any additional cost to PURCHASER

All openings left in floor for passage of ducts, pipes and cables etc. shall be covered and protected.

Each exposed end of the pipes should be securely sealed to prevent any foreign matter from entering the pipe during the installation process

The arrangement, positions and connections of pipe fittings and appurtenances shall be but PURCHASER reserves the rights to change the locations. Special precautions shall be taken for the installation of concealed pipes and/or as required. Should it be necessary to correct piping so installed, the Supplier shall be held liable for any injury caused to other work in the correction of piping. For any expedient change, the Supplier will correctly show it in shop drawings. A minimum distance between different services shall be maintained as shown in the contract documents or as approved by PURCHASER.

All exterior openings provided for the passage of piping and ducting shall be properly sealed with snugly fittings collars of metal of other approved rat-proof material securely fastened in to place.

Joints at the roof, around ducts and pipes, shall be made water-tight by the use of lead, copper, galvanized iron or other approved flashings of flashing material. Exterior wall openings shall be made water-tight.

Piping in floor shall be laid on a firm bed for its entire length. Piping shall be installed without undue strains and stresses. Vertical piping shall be securely held to keep the pipe in alignment and carry the weight of the pipe and contents. Horizontal piping shall be supported to keep it in alignment and prevent sagging. Hangers and anchors shall be of metal of sufficient strength to maintain their proportional share of pipe alignments and prevent ratting. Hangers and anchors shall be securely attached to the building construction.

These specifications are supplementary to the requirements above. All required approvals of shop drawings and materials shall be obtained by the Supplier from the appropriate authorities before proceeding with work on site. All connections to/from city points of utilities supply/discharge shall be the Supplier’s responsibility.

205. Specifications:

VRF Outdoor Condensing Unit 60 - 70 kW Nominal Cooling Capacity (Heat & Cool)

- Operation Range (Cooling): -15°C ~ 55°C
- Operation Range (Heating): -30°C ~ 24°C
- Compressor Type: Inverter Scroll
- Refrigerant Type: R-410

- Power Supply(V/Ph/Hz): 380~415v/3N/50Hz
- Sound Pressure Level(dB): 60
- Power Supply(V/Ph/Hz): 220-240V ~ 50 Hz
- Indoor Unit Type: 360 Air Discharge Cassette
- Air Flow Volume: 3 Speed
- Sound Pressure Level(dB): 40
- Drain Pipe Dia(mm): 25

The system must be a VRF all DC Inverter system and should incorporate the following features

- All compressors should be DC Inverter type compressors controlling the cooling and heating capacity automatically according to the load.
- Only a DC inverter compressor shall be used in this system and it can directly intake gas to reduce loss of overheating and improve efficiency.
- Compressors should be in redundant configuration.
- Compressors shall have DC Speed speed-varying technology to satisfy various places demands at different temperatures and shall be able to save a great deal of electricity and provide users with the utmost comfort at the same time.
- The condenser fan motors shall be DC Inverter type and shall have Step-less speed regulation ranges from 5Hz to 65Hz. Compared with traditional inverter motors, it is more efficient. It shall have Sensor less control technology to guarantee lower noise, less vibration and steadier operation.
- In auto energy saving mode, the system shall be able to self-adjust parameters according to the operation status, thus lowering the cost of electricity with up to 15% of energy saving. In compulsory energy saving mode, the system shall limit power output forcibly with up to 20% of energy saving.
- The system shall be able to remember the highest temperature outdoors. When night comes, the system shall automatically turn to quiet mode.
- There shall be an option for Quiet modes which can be set according to actual needs.
- The unit casing shall be manufactured from a minimum (90-100u) polyester powder-coated baked enamel finish sheet steel in order to have high corrosion resistance and to protect salt salt-laden environment close to where the units may be installed.
- The air outlet grilles shall have plastic-coated guards. Units access panels shall be removable with minimal screws and shall provide full access to the compressor, fan and control components, and the fan must be an inverter-driven variable speed propeller type fan.
- Outdoor fans shall be direct-drive propeller type, and shall discharge air vertically, fans shall draw air through the outdoor coil.
- Outdoor fan motor shall be totally enclosed, inverter driven with permanently lubricated ball bearings. The motor shall be protected by internal thermal overload protection.

- The indoor units of VRF all DC inverter systems shall have DC Inverter motors to realize step-less regulation. According to indoor temperature or people's actual needs, users shall set this mode through the indoor wire control.
- The system shall have its working voltage range from 320V-460V and in the places with unsteady voltage; this system shall be able to run satisfactorily.
- The system operating range in cooling mode shall be from -5° C to 52° C.
- The system operating range in heating mode shall be from -30° C to 24° C.
- The cooling or heating mode shall have option to be deactivated during a certain season to avoid the mode conflict in case of miss operation.
- The outdoor unit shall be able to be linked with a fire alarm signal. In case of emergency, unit shall automatically turn off to avoid risk or further loss.
- The outdoor unit shall be able to receive a power signal of electricity shortage. VRF system should be capable of receiving signal from the generator for load management.
- When a certain indoor unit needs to be repaired, it shall be powered off without any interruption to the system's operation.
- First-grade oil separator shall have a filtered expansion valve with a 98% of separation efficiency; Second-grade oil separation will separate the remained 2% refrigerant oil with 95% of separation efficiency. General Efficiency shall be 99.9%.
- The outdoor unit compressor shall be provided with self-balancing control and there shall be no need of external oil balancing line. By collecting and calculating the capacity output and threshold of each module, the distribution of refrigerating oil shall be automatically controlled to ensure stable operation of the system.
- The operating priority sequence of the outdoor unit modules shall be fully automated according to the parameters of compressor reliability (suction and discharge pressure, temperature, operating current, protection), and in combination with historical data correlation analysis, it can intelligently balance the running time and load, achieve variable cycle module rotation control, and extend system's service life.
- Each module shall be of an independent sub-system, and the whole system won't fail down even if partial malfunction occurs. Upon malfunction of any one of the modules, there shall be option of emergency operation after simply manual setup on the outdoor PCB switches.
- Refrigerant shall be taken into a compressor by an intake pipe and then runs through the cooling system. It shall control oil level and the minimum oil each compressor needs and therefore realize oil balance.
- Dual electronic expansion valve with its 2400-step grades of regulation shall precisely regulate refrigerant's flow between outdoor unit and indoor unit.
- The VRF all DC inverter system shall realize a combination of 4 outdoor unit modules (maximum). When error is occurred to one of the modules, the others shall perform the emergency operation to sustain the air conditioning. All the compressors in each single module

shall be DC Inverter based, when one compressor has error, others shall perform the emergency operation. Double-fan design shall ensure that one fan can still work even if the other one has error.

- The VRF all DC inverter system shall realize a combination of 4 models (maximum) and connect as many as 100 indoor units. The cooling capacity of the outdoor units should adjust automatically, according to the number of operating indoor unit(s).
- The maximum total pipe length of single outdoor unit's circuit shall have 1000 m.
- The maximum actual pipe length between indoor unit and outdoor unit shall have 200 m.
- The maximum height difference between indoor unit and outdoor unit should shall have 110 m.
- The maximum distance between the first branches to the farthest indoor unit shall have 40 m and may be extendable in special cases.
- The system should offer 2HP increments of capacity range, which should meet customer needs accurately and the maximum capacity combination should be up to 96HP.
- The system should have an inner-screw copper heat-exchanger, which can create higher heat exchange efficiency and powerful heating capacity especially in low ambient temperature. Outdoor heat-exchange area should be adjusted by running load. The system should have dual EXV, which should achieve up to 2400 steps refrigerant adjusting precision to ensure precise control of refrigerant and raise system circulation efficiency.
- The combination of one main and one auxiliary four-way valve should control the outdoor heat exchanger and outdoor air flow independently and according to the load, adjust the heat exchange volume of outdoor unit accurately and prevent wasting the capacity in part load time. Main 4-way valve should be used as the traditional 4-way valve, while the auxiliary 4-way valve should be used to adjust the heat-exchanger area of outdoor unit when in cooling mode.
- The outdoor unit shall have optional heat storage device for fast defrosting. (If required)
- The outdoor unit's condenser fans shall have external static pressure of 110 Pa in case of outdoor units' placement inside the building.
- The compressor shall be provided with an integrated sound absorber and shall be enclosed inside metal sound proof box to minimize the noise.
- The outdoor unit shall be equipped with sudden high voltage shock prevention technology so that the internal components may not damage. Lightning protection shall also be provided.
- The unit shall be equipped with anti-wind function as before the unit starts up, if the fan moves backward because of the wind, the energy braking control may stop the fan and then start up the unit according to normal procedure.
- The outdoor unit shall be equipped with dust removal function.
- VRF condensing units shall be provided refrigerant cooled PCB boards.

(xxxviii) Controls system for VRF All DC Inverter system:

- The system should have Individual control, group control, network control options.
- The system should have network control system that can realize intelligent management to the A/C system.
- The remote monitoring of the system shall be possible through DCIM

The system shall have auto debugging features like:

- The system shall be debugged by one-button debugging option or with laptop and pad-based option for quick commissioning.
- Automatically allocate ODU and IDU addresses
- Automatically calculate numbers of ODU and IDU
- Automatically detects errors;
- Automatically starts debugging.
- VRF Central Controller shall adopt CAN based communication technology.

(xxxix) Air Cooled Condensing Units (CU-Units)

The condensing unit shall be of the vertical discharge, air cooled type, suitable for outdoor installation and sized to deliver the required capacity matched to relevant indoor units at specified ambient temperature. The condensing unit shall be of same manufacturer as that of Indoor A.C. Unit.

The condensing units shall be air-cooled type incorporating heat exchanger coils manufactured from copper tube copper fins or Aluminum Manganese anti rust alloy which should be coated with Golden Protection Layer (Components: Epoxy Resin & Modified Acrylic, Silicon free), the anti-corrosive performance in salt-spray testing must be at-least 200% higher than normal blue/golden fins, factory treated to reduce the effect of atmospheric corrosion. The color shall be manufacturer's standard. The air outlet grilles shall have plastic coated guards.

All outdoor units are to be permanently marked with an identification number. The removable access panels are also to be marked with the same number.

The outdoor units are to be Variable Refrigerant Flow (VRF) based centralized combination of multiple outdoor units of capacities given in schedules.

The outdoor units shall have all DC inverter compressors electronically controlled and capable of varying refrigerant flow with variation in cooling/heating requirements.

The capacity control of the outdoor units will be digitally controlled and shall be determined electronically by sensing operational temperatures, pressures, and ambient temperature etc.

The access to the internal components for maintenance purposes shall be by removable panels.

It shall be possible to connect up to 100 indoor units, capacity permitting, to one modular outdoor unit.

The outdoor unit shall have full capacity control to meet the load fluctuation up to 135%.

(xl) Indoor Units

Direct Expansion Type Air conditioning units each carrying its own thermo-static expansion valve, shall be ceiling recessed (Cassette type) reversible, (Heat pump) type or ceiling concealed ducted type or Decorative Wall Mounted. All necessary components/parts shall be selected manufactured and assembled by the same manufacturer as for outdoor condensing units with Scroll Compressors.

The Indoor units shall include following items:

- DX.- Type coil
- Washable filters
- Supply air fan with Step less DC Inverter motor
- Automatic air swing facility. (Wherever required with the unit)
- Drain arrangement.

The following type of indoor units may be used for this type of system.

(xli) Four-way discharge cassette

The unit casing shall be manufactured from galvanized steel plate and shall be fully insulated.

Facility shall be provided for duct connection for the introduction of fresh air in the unit.

The fan shall be of propeller type, statically and dynamically balanced to ensure low noise and vibration-free operation.

The heat exchanger coils shall be manufactured from copper tubes and aluminum fins. It shall have an electronic expansion valve to control the refrigerant flow rate in response to the load variation in the conditioned space. The expansion valve shall be controlled by an integral computerized control system to maintain the desired room temperature.

The low-profile dedicated decoration panel shall be provided for each unit. The decorative panel shall incorporate the return air grille and supply air louvers. A facility shall be provided to automatically swing the supply air lovers or lock them at a desired angle to ensure even distribution of the airflow.

The low-profile dedicated decoration panel shall have an option of Auto lifting and lowering of grill for better cleaning. A condensate drain pump shall be provided with the unit. The condensate shall be drained from the unit using thermally insulated u PVC piping and run directly to the nearest drain piping mains.

The air filters shall be incorporated within the unit and shall be mold resistant washable type.

(xlii) Ceiling concealed Duct type

The unit casing shall be manufactured from galvanized steel plate. Facility shall be provided for duct connection for introduction of fresh air in the unit and branch ductwork from the unit. The return air to the unit shall be through the bottom/back of the unit as per manufacturer’s standard.

The heat exchanger coils shall be manufactured from copper tubes and aluminum fins. It shall have electronic expansion valve to control refrigerant flow rate in response to the load variation in the conditioned space. The expansion valve shall be controlled by an integral computerized control system to maintain the desired room temperature.

The condensate shall be drained from the unit using thermally insulated u PVC piping and run directly to the nearest drain piping mains.

(xliii) Wall mounted type

The unit casing shall be manufactured from heat resistant plastic. The casing color shall be manufacturer’s standard. The fan shall be cross -flow centrifugal type, statically and dynamically balanced to ensure low noise and vibration free operation.

The heat exchanger coils shall be manufactured from copper tubes and aluminum fins. It shall have electronic expansion valve to control refrigerant flow rate in response to the load variation in the conditioned space. The expansion valve shall be controlled by an integral computerized control system to maintain the desired room temperature.

The condensate shall be drained from the unit using thermally insulated u PVC piping and run directly to the nearest drain piping mains.

The bidder must provide documented evidence of all the technical parameters mentioned above in catalogue or from the manufacturer.

(xliv) Drawings, Changes & Installation

The drawings shall be considered to show the general character and scope of the work and not the exact details of the installation. The installation shall be complete with all accessories required for a complete and operative installation.

The location, arrangement and connection of equipment and material represent a close approximation to the intent and requirements of the Contract. The right is reserved by PURCHASER to make reasonable changes required to accommodate conditions arising during the progress of the work, at no extra cost to the Contract.

All piping and duct work in finished areas shall be concealed in ceiling spaces and shafts or chased into walls. No exposed piping or duct work shall be installed in such areas unless specifically accepted by PURCHASER.

Any pipe or mechanical equipment mounted on roof, or housing for such equipment, shall not be closer to the edge of roof than a distance equal to the height of the pipe, hood or equipment; unless specifically accepted by PURCHASER.

The actual location of sensing devices, thermostats, switches, etc., shall be reviewed by PURCHASER before installation.

The location and size of existing services shown on the drawings are based on the best available information. The actual location of existing services shall be verified in the field before work is commenced.

Changes and modifications necessary to ensure coordination and to avoid interference and conflicts with other trades, or to accommodate existing conditions, shall be made at no extra cost to the Contract.

The Supplier shall ensure that all plant to be supplied by him can be installed in the available space and that there is adequate access to admit all plant to its position and enable maintenance to be carried out on the plant without difficulty.

Special care shall be taken in areas where pour-gaps take place. Coordinate the work schedule with the Supplier.

(xlv) Examination of Site

Before responding to this tenders each bidder shall examine the site to determine the conditions which may affect the proposed work. No claims for extra payment will be considered, because of failure to fulfill this condition.

206. Suppliers Technical Responsibilities

(xlvi) Concrete Foundation

The concrete foundations for supporting equipment, such as floor-mounted condensers, should extend 6 inches beyond the outer edges of the equipment, unless otherwise specified. These foundations are to be cast within forms constructed using new, planed 6-inch nominal lumber. To ensure neatness, all corners of the foundations should be chamfered using either sheet metal or triangular wood strips securely attached to the forms.

Foundation bolts are to be embedded in the forms during the concrete pouring process, and their precise positioning should be facilitated with the use of templates. Each bolt should be placed within a sleeve that provides a half-inch clearance around the bolt. Additionally, it's important to allow for 1 inch below the equipment bases for alignment and grouting.

After the grouting process is completed, foundations for equipment situated on the building's exterior should be constructed in accordance with the specifications detailed in the Shop Drawings submitted by the Supplier for review by the Architect/Engineer

(xlvii) Ceiling Suspended Equipment

All equipment hangers shall have static deflections equal to or larger than 25mm.

(xlviii) Vibration Isolators

All steel spring isolators should include a neoprene pad at least 10mm thick mounted next to and in series with the spring. Seismic restraints should be employed in all steel spring isolators to limit movement of the equipment in the vertical and horizontal directions.

All rubber isolators should be double acting with no through-bolted connections. There shall be at least a 50mm air space between the bottom of the isolated equipment and the floor slab.

(xlix) Painting for Piping and Equipment

The Supplier shall paint all equipment, ducting, piping, hangers, bracing and other surfaces exposed to air as specified and he shall also be responsible for all finish painting.

Material for painting shall be high grade products of well-known manufacturers and when approved shall be delivered on the site in original unbroken packages bearing the maker’s name and brand.

Piping shall be insulated

Each pipe shall be insulated separately with pre molded pipe insulation and gaps, if any, shall be filled with the same insulation material. All circumferential and longitudinal joints shall be sealed with at least 50mm wide self-adhesive tape of approved quality.

(l) Refrigerant Pipe

Refrigerant pipes shall be Copper pipes shall be installed strictly in accordance with manufacturer recommendations.

(li) Test Run

The Supplier shall be required to carry out test run(s) as required.

(lii) Commissioning, Testing and Adjusting of HVAC

The air conditioning system described in this specification and shown on the drawings shall be commissioned. All commissioning Engineers/specialists shall be qualified to undertake such work and then competence shall be demonstrated to the satisfaction of PURCHASER.

207. Ancillary Work

208. Security & Surveillance System

- Should be an IP based CCTV System.

- CCTV manufacturer should be ISO 9001 Certified, and in large scale CCTV manufacturing business. The proposed Make, Brand should have global and local reference installation in Rated/Tier-III Data centers.

(liii) Cameras

Fixed HD Bullet IP Camera Wall Mounted

- Megapixel, 1/2.7" Progressive Scan CMOS , Color: 0.001 Lux @ (F1.0, AGC ON) Day/Night Vision, Motion Detection HD Bullet Camera
- Resolution 2688 × 1520, IR Illumination Range: 50m IR Night Vision
- True WDR 120dB, intrusion detection, motion detection, line crossing
- Camera shall have a horizontal and vertical 'Field Of View' wide enough to completely cover all areas
- 128GB local memory for storage
  802.1x authentication

Fixed HD Dome IP Camera Ceiling/Wall Mounted

- Color 4 Megapixel Day/Night Vision, Motion Detection HD Dome Camera
- Resolution 2688 × 1520, IR Illumination Range: 50m IR Night Vision
- True WDR 120dB, intrusion detection, motion detection, line crossing
- Camera shall have a horizontal and vertical 'Field Of View' wide enough to completely cover all areas
- 128GB local memory for storage
- 802.1x authentication

Thermal Bullet Camera for Core Components

- Image Sensor Vanadium Oxide Uncooled Focal Plane Arrays
- Thermal Resolution 256 × 192
- Pixel Pitch 12 µm
- Spectral Range 8 µm to 14 µm
- Focal Length 3.6 mm
- Min. Focusing Distance 0.4 m
- Heat detection and alarm, tripwire, intrusion, and target filtering.
- Digital Zoom × 2, × 4
- Optical Module, Image Sensor 1/2.7" Progressive Scan CMOS

- Resolution 2688 × 1520
- WDR 120 dB, Image Effect
- Target Coloration Yes. Supported in white hot and black hot mode.
- 128GB local memory for storage

(liv) Network Video Recording Solution

- 128 Channel Network Video Recording solution Rack Mounted with SAN Storage
- Simultaneous view, with 90 days recording 25fps@ full resolution , playback, backup & remote monitoring
- Supports HD recording with cameras up to 5MP
- Video Compression: H.264 / H.265
- Storage Capacity: 90 days
- Copy of all recordings on cloud storage for 15 days with overwriting capability
- HDD with RAID-5
- Automatic backup and storage on backup media
- Network Interface 10/100/1000-Base-TX, RJ-45
- VGA OUT & dual HDMI outputs with output resolution of 4K and 1080p
- Remote access via iOS, Android, PC / Mac
- Integrated with NOC & DOC Room Video Walls
- Behavior analysis features : intrusion, area entry, area exit

(lv) Video Management Software

- Designed to meet a variety of security challenges on a single platform
- Manage multiple individual systems, such as video security, access control, security alarms etc.
- Open architecture permits easy integration with third party systems and hardware

(lvi) Other Hardware & Cabling

- CCTV Management Workstation (Core i7 Slim Branded Desktop PC with Windows 10 Prof 64bit, 16 GB RAM, 2TB HDD & DVD Writer) including monitor, Keyboard & mouse
- 24 Port Managed 10/100/1000 Layer 3 Stackable full POE switch, 2 x10G SFP ports, 100 Gbps forwarding bandwidth, enterprise class security features, SNMP support, Redundant Power Supply, stacking cable
- CAT-6 Structured Cabling for complete CCTV system as per manufacturer recommendation in cable tray/EMT Conduit

209. Access Control System

- Biometric Access Control 4 in 1 Face/ Fingerprint/RFID Card/PIN Recognition, EM Lock (600Lbs), ZL Bracket, Exit Push Button, POWER Supply, installation and integration with DCIM
- "CE/FCC or equivalent certified
- Minimum Users Capacity = 1000"
- Touch Screen size - 4-7 inch
- Electromagnetic Door Lock with Magnetic Contact and matching power supply
- Contactless/Touch-free Exit Button with Beep sound & LED Status Indicator
- Door Panic / Push Bar
- Manual Key Over-Ride
- Door Siren
- Emergency Door Release
- Remote door release switch at reception counter

Access Control and Time Management Server (Hardware + Software) required functionality and Features:

- WEB Portal, Client Server Topology
- Native Access, SQL Express, SQL, MySQL, Oracle
- Export Attendance data
- Unlimited Users, PUSH technology
- Message Broad Cast Facility, Emergency Alarm Action
- System integrated with CCTV
- Provides cardholder management, door force alarm, door too long open alarm, full alarm and event processing, alarms
- Alerting via email
- Detailed audit trail records
- Built-in flexible reports
- System Calendar (for sophisticated scheduling)
- Face template management
- Attendance Management
- Shift Management

Visitor Management System integrated with Main Access Control required functionality and Features:

- Visitor registration

- Web based preregistration by hosts
- Host notification on visitor arrival
- Print professional color visitor passes with expiration date, visit area, host, and purpose of visit
- Visitor sign out and notification to host
- Includes: Front desk workstation, camera, signature pad, business card/ID Card/Driving License scanner, visitor pass printer and software
- Proximity Cards HID credit card standard size and thickness, thin, flexible polyvinyl chloride laminated, passive type, easy printable on both sides
- Access Control manufacturer should be ISO 9001 Certified, and in large scale access control manufacturing business. The proposed Make, Brand should have reference install base in Tier/Rated-III Data Centers in Pakistan.

210. Video Wall Display

Video Displays manufacturer should be ISO 9001 Certified, in large scale screen manufacturing business for at least 10 years, among world renowned leading brands

The proposed Make, Brand of all video displays should be from same manufacturer

The users should have the flexibility to display live overlay windows from HDMI, HDBaseT, SDI input, PC input and network input. These live inputs are displayed in real time and scaled to the desired position and size. These overlay inputs can overlap with the graphics windows and with each other

Video controller can be from same manufacturer or third-party but fully compatible with Video Wall

- Each LED Panel Size: 55 inches Diagonal.
- Industrial grade IPS LCD panel, suitable for continuous 24h/7 operation
- Brightness: 500 cd/m2 or high
- Ultra-narrow 0.9mm bezel-to-bezel design or low · Anti-glare panel, vivid and memorable image quality
- Response Time: 8ms
- Input: Display Port, HDMI 2, DVI-D, Analog, USB, Audio
- Same OEM supplied Pop-up type wall brackets
- Sensor: IR/Ambient

Video Controller should support:

Multi input and Multi output

Both single/split views and multiple inputs from different IT and Facility monitoring systems

211. Cable Tray & Ladder

Locally manufactured NEMA compliant perforated Cable Tray gauge 16SWG with cover, Hot Dip Galvanized, appropriate sizes and lengths of MS Rod / Angle Iron Supports, C-channel and anchor Bolts (HILTI/FISHER), including cutting, welding, jointing and necessary required hardware etc. for installation at ceiling, wall, raise floor or in floor screeding etc. as per Specifications, complete in all respect

Locally manufactured NEMA compliant perforated Cable ladder, Hot Dip Galvanized, appropriate sizes and lengths of MS Rod / Angle Iron Supports, C-channel and anchor Bolts (HILTI/FISHER), including cutting, welding, jointing and necessary required hardware etc. for installation at ceiling, wall, raise floor or in floor screeding etc. as per Specifications, complete in all respect

212. Wiring for lighting & Power Socket

Circuit wiring from DB-LP to Switchboard including wiring between switch on the same circuit with 2x2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable + CPC 2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable in 25mm diameter EMT conduit, surface / recessed in wall, column, etc., including with all conduit accessories, connectors, ceiling rose, flexible wires, sheet steel boxes, tagging etc.

Point wiring for light point from Switch Board to Light Point with 2x2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable + CPC 2.5 sq.mm 1 core Cu/XLPE/LSZH insulated cable in 25mm diameter EMT conduit, surface / recessed in wall, column, etc., including with all conduit accessories, connectors, ceiling rose, flexible wires, sheet steel boxes, tagging etc.

Supply & install new lighting point's c/w light switches and using 2 x 1C/1.5mm sq. PVC cable in PVC pipe for Server room, NOC, MM, Lobby and Power rooms

Bidder shall propose any additional wiring as per their proposed electrical design.

212.1.1 Internal, External Lighting & Fixtures

- Supply of following specialized 24x7 type light fixtures complete with LED lamps/panels, compliant to IEC 60598, IEC 62031 or equivalent standard, Electronic Driver including all suspension, rated life 50,000 hours, standard white or day light white 5000k colors, mounting, fixing and hanging materials, brackets, chains, hooks etc. as per Specifications including all accessories, complete in all respect
- Light manufacturer should be ISO 9001 Certified, and in large scale light manufacturing business for at least 20 years
- Installation and fixing of data center special lights LED (min 500 LUX) antiglare size 2 ' x 2' with motion sensor for Server room, 2x MMR, 2x Power rooms, Staging room, 3x Stores
- Pole mounted LED Flood Light, 100W, IP65 including Pole for Generators, Transformer & Roof top

  Stand Alone Motion/Occupancy Sensor (IP-40) having following specifications:
  - Coverage Range: 360°
  - Operating Voltage: 230V AC
  - Timing Range: 5 sec to 20 minutes

- Supply, installation and fixing of special lights LED (min 500 LUX) antiglare size according to proposed design
- for, NOC, SOC, Systems team room, Network team room, CISO Room, Chief IT Room, Secretary IT Room, Lobby"
- All concealed outlet boxes for switches, sockets and other receptacles shall be rust proof and shall be smooth external and internal surfaces. All outlet boxes for receiving plug sockets and switches shall be of standard factory make and of approved size, and shape.
- All 5/15 amps switches shall be enclosed type flush mounted for 230 volts AC. The box in which the switches are fixed shall have an adjustable plate cover. Ample space at the back and sides shall be provided for accommodating wires. Switch, controlling the light point shall be connected to the phase wire of the circuit. The Switch plate shall be white plastic or any other approved type and it should match the interior design
- All power sockets shall be of shutter type
- Given the varying usage patterns of data centers throughout the day, it is advisable to implement adaptive lighting solutions that can flexibly accommodate these requirements while promoting energy efficiency. It is suggested to employ a three-tiered lighting protocol
- Level one: The initial lighting tier is optimal for use in an empty data center, where a minimal level of illumination will be maintained to facilitate effective video surveillance and safeguard the facility.
- Level two: The second lighting tier comes into play as soon as staff members enter the data center. This additional lighting also aids security personnel in identifying individuals entering the room.
- Level three: The third lighting level is specifically tailored for equipment maintenance and repair tasks, providing the brightest illumination.
- All the fixtures shall be suitable for single phase, 50Hz, 230 Volts, AC supply system.
- Supply of specialized 24x7 type light fixtures complete with LED lamps/panels, compliant to IEC 60598, IEC 62031 or equivalent standard, Electronic Driver including all suspension, rated life 50,000 hours, standard white or day light white 5000k colors, mounting, fixing and hanging materials, brackets, chains, hooks etc. as per Specifications including all accessories, complete in all respect

213. Emergency/Exit Lighting

Rechargeable NiCad battery-operated (3hrs backup) self-test LED emergency lights, rated life 50,000 hours, compliant to BS5266/IEC598-2 or equivalent standard as per Specifications including all accessories, complete in all respect

214. Structured Cabling

- All cables shall be installed in accordance with latest issue of BS EN50174 and the manufacturer’s instructions and recommendations. Care should be taken to ensure the minimum bend radius is not exceeded thereby preventing kinks in the cable construction. Power and data separation must be adhered
- Fiber items including all accessories, complete in all respect required to establish the fiber network connectivity of new main Data Center with MMRs

- Fiber Patch Panel 48 Port - MMR 1&2
- Fiber Optics Multimode OM-4 LC/LC Patch Cord MMR 1&2 to Server room distribution Racks
- Cat 6/7 UTP patch cord Cable with RJ-45 Connectors (Ready to use) Server room racks
- Cable Management - Complete floor
- 4"x4" Rigid PVC Fiber Raceway and Routing System
- Supply and installation of CAT-6 Network cabling including faceplates and metal back boxes for NOC, SOC, Systems team room, networks team rooms, MMR, Power rooms' Staging area, Lobby, security/reception area and few nodes in Server room and integration of DCIM.
- Structured Cabling manufacturer should be ISO 9001 Certified, and in large scale cable manufacturing business for at least 10 years. The proposed Make, Brand should have reference install base in Tier/Rated-III Data Centers.
- 48 port shutter type Cat-6, RJ 45 UTP Patch Panel fully loaded with tool less jacks and cable manager
- Dual shutter face plates including I/Os for all tables in NOC, SOC, Systems team room, Networks team room, CISO Room, Chief IT Room, Secretary room, conference room and allied facilities

215. Rodent Repellent Solution

- Ultrasonic rodent repellent solution of active multiple devices
- Ability to configure Variable frequency
- Solution for Complete Ground Floor, Genset & transformer area

216. Civil & Interior Work

The work will be executed as per following specification:

217. Brick Work

Providing and laying first class burnt brick masonry walls 4" or 9" as per approved drawing.

218. Plaster Work

Providing and laying 1/2" - 3/4" thick ordinary Portland cement & Sargodha sand plaster 1:4 on brick walls at any floor, any height, making edges, grooves and corners, including preparation of surface before plastering by rubbing with wire brush and washing with clean water, curing, finishing, scaffolding, lifting, hoisting etc. complete as per design and directed by the site Engineer.

Chicken wire mesh is to be provided at the junction of concrete and masonry work or wherever it is required before plastering work.

218.1.1 Dismantling Work

- Dismantling current wall paneling, partitions, false ceiling, electrical fixtures, and any surplus items.
- Extracting designated door frames along with their shutters, including fixtures and hardware.

- Eliminating all existing electrical fittings, encompassing wiring, cables, panels, distribution boards.
- Clearing out any other outdated materials or fixtures in the first-floor area that are no longer needed
- Properly disposing of all removed materials as needed while ensuring site cleanliness

219. Plumbing work:

Plumbing Fixtures

- Providing and fixing Sanitary ware of Porta/Imported make with all Sanitary fittings of (Faisal, Master, Sonex or equivalent) make including Muslim shower, Double Bib Cock, Towel Rail, Soap dish, Coat Hook & Toilet paper holder etc. complete in all respect or as directed by consultant.

- Providing and fixing CP sink mixer (Faisal, Master, Sonex or equivalent), C.P pipe 15mm dia. complete including pipe connection, all fittings, testing etc.

- Providing and fixing stainless steel rectangular kitchen sink (Faisal, Master, Sonex or equivalent) of size (30"x18"x8") fixed in marble counter pasting with Jelly/silicon with 15mm dia C.P white powder coated brass 40mm dia heavy duty waste coupling and PVC flexible waste pipe of approved make and quality complete in all respects.

- Providing and fixing European type ceramics ware coupled water closet, white / light color including 3 gallons cistern, P/s Trap, PVC flexible pipe connection, C.P tee stop cock with wall cups, "Grohe, Porta or equivalent".

- Providing and fitting Glazed eastern ware water closet, squatter type (Orissa pattern), combined with foot rest, Best Quality including ceramic Flushing tank Porta, Grohe or equivalent connected by concealed arrangement, tee stop cock for cistern water inlet and C.P connector with nuts and fitting, approved other ancillary material complete in all respect.

- Providing and fixing wash hand basin fixed "Porta or equivalent over counter with all accessories, 1 1/2" dia. P.V.C (D-type) waste pipe, connections to water lines, C.P grating including C.P bottle trap, testing etc.

- Providing and fixing 15mm dia C.P bib cock/mixer "Make" (Faisal, Master, Sonex or equivalent) chrome, C.P pipe 15mm dia. Complete including pipe connection, all fittings, testing etc.

- C.P Muslim Shower with double bib cock with flexible pipe of "(Faisal, Master, Sonex or equivalent)" Powder coated, complete in all respect.

- Provide and fixing soap dish, toilet paper holder and towel rail steel/Aluminum 24’’ long and 3/4" dia.

Plumbing System

- Providing and fixing complete plumbing system by best quality UPVC, PPR piping complete in all respect including connection.

- Kitchen Complete Internal Water (Hot & Cold) & Sewer System Job.

- Toilets Complete Internal Water (Hot & Cold) & Sewer System Job.

Fittings

- 3" Dia UPVC pipe for drainage & Rain water complete in all respect. (Make: Dadex, AGM, Plasco or equivalent as approved consultant)
- 4" Dia UPVC pipe for drainage & Rain water complete in all respect. (Make: Dadex, AGM, Plasco or equivalent as approved consultant)
- 6" Dia UPVC pipe for drainage & Rain water complete in all respect. (Make: Dadex, AGM, or equivalent as approved consultant)
- 32mm PPRC pipe for water supply (Hot &Cold) complete in all respect. (Make: Dadex, AGM, or equivalent as approved consultant)
- Providing and fixing of full way gate valves of bronze trim up to 3" (75mm) dia. With threaded ends and cast iron body bronze trim flanged ends for 4" dia. (100mm) and above Econosto make (Japan) or equivalent or similar for 125 psi together with all additional material required for a complete installation as described in the specification and as shown on drawing.

Floor Drain

- Providing and fixing 100mm dia uPVC floor drain/gully manufactured by UPVC Dadex/ AGM (U.A.E). including , cement concrete (1:2:4) chambers all around with heavy duty Stainless Steel / UPVC grating, hinged on one end of " SONEX, MASTER, FAISAL or equivalent" complete in all respects.

220. Flooring & Special Finishes

Floor Tiles

Commercial office grade full body Porcelain 2’x2’ scratch resistant floor tiles with 4” skirting as per approved color and finish, imported Kale/RAK or equivalent & grouting with matching grout material of Stile, quality laying, testing and commissioning of above items

Fixing of 4" high skirting of same tiles at any height/any floor, complete in all respect.

Washroom/Pantry Tiles (Walls & Floors)

Providing & fixing half body Porcelain imported wall Tiles Kale/RAK 12"x24" (300mm x 600 mm) in Elevation including 1:4 rough plaster, stuck with base coat of Dry bond or approved equivalent, grouting in matching color, incl. Removal of existing plaster etc. to accommodate new finishes, including all cuttings, grouting, and making all details complete in all respect as architects instructions.

Providing & fixing full body Porcelain Kale/RAK **Floor Tiles** of size 12"x24" (300mm x 600 mm) including 1:4 rough plaster, stuck with base coat of Dry bond, grouting in matching color, incl. Removal of existing plaster etc. to accommodate new finishes, including all cuttings, grouting, and making all details complete in all respect as per drawings and architects instructions.

Granite in passage floor

Providing and laying pre polished 3/4" Granite blue pearl as approved quality and size on any type of flooring, straight or curved, as per drawings, laid with cement slurry over cement sand mortar (1:4) or bond, including filling of joints with grouting material, complete in all respects.

Granite in passage walls

Providing and laying pre polished 3/4" Granite coffee brown pearl as approved, quality and size on any type of flooring, straight or curved, as per drawings, laid with MS Channel, including filling of joints with grouting material, complete in all respects.

221. Modular Wall Partitioning Fire resistant

Supply of Modular Dry Wall Partition System as per Drawings and Specifications including all accessories, complete in all respect

Dry wall manufacturer should be ISO 9001 Certified, and in large scale drywall manufacturing business for at least 15 years. The proposed Make, Brand should have reference install base in Tier-III Data Centers or Telecom Sites.

2 hour Fire Rated walls for Data Center, Network room, System/Backup team room, NOC/infrastructure room, holding room, staging room, buffer area. 5”-to-6” thick 2 hour fire rated Modular Dry Wall partitions (imported), consisting of double layered 15mm or thicker fire resistant type C or X Gypsum boards on each side. Galvanized steel Metal Profile (frame studs/standing frame/steel channels) insulation, bolts, screws, fitting and finishing accessories etc., heavy weight anchoring where required, 4” PVC skirting, acoustic and noise control, moisture/liquid resistant. Includes painting three coats of matt enamel lead-free, dust/moisture resistant paint (on both sides of partition) of approved color and finish

Certified to BS 476 or ATSM E119 or DIN 4102-4 or equivalent standard

Note: Gypsum Board, Metal Profile (frame studs/standing frame/steel channels) insulation, bolts, screws, fitting and finishing accessories etc. should be from same manufacturer. Fire Rated Drywall design, installation and commissioning should be validated and endorsed by manufacturer

222. Modular Wall Partitioning

5”-to-6” thick Modular Dry Wall partitions consisting of 12mm or thicker Gypsum boards, OEM supplied galvanized steel studs/standing frame/steel channels, fitting and finishing etc., heavy weight anchoring where required, 4” PVC skirting, acoustic and noise control, moisture/liquid resistant. Includes painting three coats of matt enamel lead-free, dust/moisture resistant paint (on both sides of partition) of approved color and finish

Note: All installation and finishing material shall be drywall OEM supplied

Installation, testing and commissioning of above items

223. Glass Partition

Supply of following Glass Partitions as per requirement, complete in all respect

Commercial Office grade 12mm tempered frameless frosted glass partitions

Installation, testing and commissioning

224. Doors

Supply of following Doors as per Specifications, complete in all respect. Finishing with high-quality aesthetics

Fire Rated: A two-hour fire-rated door, constructed from powder-coated G.I./Steel, UL Listed, will be employed. This door will include an automatic closer and a vision panel for enhanced security and acoustic control.

- The door frames and shutters are Zinc Phosphate with epoxy primer and finish with PU paint. All doors should have suitable locking mechanism with 3 keys each
- The internal construction of the door shall be specially designed with infill to give 2 hours fire rating. All the doors will have flame retardant Honey Comb Crafted Paper or equivalent infill.
- The door leaf will have a minimum thickness of 40mm, with a face/back/frame steel measuring 1.2mm. Gaskets will be used to ensure a secure seal, and the hinges, typically 3 to 4 in number, will be made of stainless steel and of the shrouded or concealed bearing type, and with one fitted to each leaf.
- In addition, lever bolts will be installed, with one on the top and one on the bottom of the door. The door will be tested in accordance with recognized standards such as NFPA 252, EN 1634-1, UL 10C, or an equivalent standard like BS 476 Part 22. The installation will comply with NFPA 80 regulations. The proposed make and brand of this door should have a reference installation base in Rated III Data Centers
- The necessary fixing arrangements should be provided to mount the doorframes to the modular dry wall.
- Vision Glass: 2 hours Fire Rated Vision Glass with minimum 8mm thick clear glass in rectangular shape dimensions of 200mm x 300mm to be fixed

Wood Doors: The door will feature a sturdy wooden frame.

- The wood panels will be crafted from natural wood, and the frame will be securely joined at the intersections of its components.
- Each individual component will be carved from a single piece of timber.

- Commercial grade with SS handle.

  Glass Doors: Commercial Office grade 12mm tempered glass door including Stainless steel frame on top and bottom, frame should be specialized type for Dry Wall installation, floor spring, bottom patch lock, SS handles, frosting

  Bullet Proof Doors: Commercial Office grade 12mm tempered glass bullet proof door including Stainless steel frame on top and bottom, floor spring, bottom patch lock, SS handles

225. Paint Work

Supply of following Paint Works as per Drawings, complete in all respect

Painting two coats of Flame Retardant Durable Matt lead-free, dust/water/moisture resistant paint, on existing concrete/brick walls of approved color and shade and preparation of surfaces with priming, putty/under coat

226. Filing Cabinets

Providing, fabricating and fixing in position filing cabinets consisting of 3/4" thick laminated board box (back, side and shelves), shutter and drawers, with molding 1/2”x3/4” including nails, screws, bolts, hinges, catchers, imported steel glides, locks, handles 3 coat of sprit polish of matching shade on lipping and wood preservative treatment and all other accessories complete in all respects including Anti-Termite treatment. (Interwood, workman or equivalent)

18" Deep (Full height 7 ft. high) & 18" Deep (Low Height 4 ft. high)

227. Kitchen Cabinet

- **Wall Cabinet** Providing and fixing in position hanging type open shelves; cabinet frame made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, cabinet shutter made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, approved, on top, front and side with grooves; 3/8" thick lacquered deodar wood lipping on all edges; including divider, shelves; imported magnetic hinges, lock, stainless steel handles. (Interwood, workman or equivalent)

- **Floor Cabinet** Providing and fixing in position low height type cabinets; cabinet frame made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, cabinet shutter made up of 20mm thick mdf board pressed on both sides with A Grade Lamination, approved, on top, front and side with grooves; 3/8" thick lacquered deodar wood lipping on all edges; including divider, shelves; imported magnetic hinges, lock, stainless steel handles with polish finish as per approved samples. (Interwood, workman or equivalent)

- **Dining table** Provision of 8 seater Dining table with chairs.

228. Furniture and Fixtures

Supply of following high quality branded Furniture items as per Drawings including all accessories, complete in all respect

Note: The dimensions of furniture and fixtures are flexible as per approval and as best suited for site conditions. All furniture items shall be of high quality and as per approved design and finish

Furniture manufacturer in Pakistan should possess a manufacturing facility equipped with an automated production process and a minimum of a decade's worth of experience

229. Meeting Room:

1 x Meeting Table structure in solid wood/Oak Veneer durable non scratch laminated top, with integrated cable management system on top & cubby for 16 persons.

27 x Ergonomic imported Meeting Chair 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

230. NOC Room:

Purpose designed Modular NOC Console for Network operation center with 24" deep countertop, Adequate knee and leg space, High-pressure laminate scratch resistant work surface, Vertical and horizontal cable and wire management, brush grommets for cable crop, integrated universal power outlet x 3, Network point (3m or equivalent) Not heavy, but robust, CPU holders and keyboard trays, Ventilated sliding front and rear access panels lift-off for easy access to equipment from the back

Ergonomic imported Operator Chair, 4-dimensional padded arm rest, lumbar support, adjustable backrest & headrest, flex mesh breathable tensile fabric, hydraulic wheel base, reclinable, adjustable seat height, tilt locking

231. Signage Work

Supply and fixing of Signage Works, complete in all respect

Flush mounted engraved Room Signs & Name Plates. Signages in corridors shall be mounted on right angled brackets

232. False Ceiling

Supply and fixing of false ceiling as per approved design and finish, complete in all respect

Note: False Ceiling shall be as per approved size and in accordance with interior designing works

Imported non-combustible aesthetically designed False Ceiling in Operations Area

233. Interior Designing Work

Offer comprehensive interior design services that encompass top-tier materials such as cladding, wall finishes, flooring, color schemes, and more, for NOC, conference room, Kitchen, Washrooms, corridors etc. The designs should align with global IT office trends, ensuring a fully furnished and aesthetically pleasing environment

The bidders should include the following design documents in their proposal allowing PURCHASER to select the most suitable solution

Furniture and Fixture Details and Layouts

MEP and Lighting Details and Layouts

Floor and Wall Finish Details and Layouts

Reflected Ceiling Plan Details and Layouts

3D render imaging/video

Note: The Bidder shall appoint a professional interior designer for this job

Bill of Quantity (BOQ)

Sr.#	Equipment Details - RTO Islamabad Site	U/M	Quantity
A	**Core Components**		
1.1	IT racks 600x1070/1100 - EIA/TIA Compliant 16+10 racks for server room, 4 racks for MMRs, 2 Racks for staging room Networks racks 800x1070/1100 - EIA/TIA Compliant 2 Racks for Server room, 2 Racks for MMRs,	No.	36
1.2	Modular Fire Rated Hot / Cold Aisle Containment System for Server Room 20x racks and required cooling units. Compatible with OEM and third-party racks Modular Fire Rated Hot Aisle Containment System for Server Room 10x racks and required cooling units. Compatible with OEM and third-party racks	Lot	1
2.1	Rack PDU - 32A - 7KW or above - Metered- Single Phase For server room only	No.	52
2.2	Rack PDU - 16A - 3KW or above - Metered- Single Phase 8x MMRs racks, 4x Staging rooms racks and 8x network racks	No.	20
2.3	Rack PDU - 32A - 7KW or above -3-phase in / 3 phase out For Exadata racks	No.	4
3	160KW UPS, Hot Swappable, Modular Type UPS for IT Racks, 30-60KW module, 30 mints backup time, N+1 modules (N+1 Module), Li-Ion Batteries with Battery Management system	No.	2
4	Rack based Modular Power distribution for UPS output, (compatible to above mentioned PDUs) System Capacity: The PDU shall support provide 200-250 kW output	No.	2
5	UPS - For Facility Load 60KW or above UPS- Parallel for Power with VRLA batteries	No.	2
6.1	Inrow DX Cooling Units,without humidifier & dehumidifier- at least 24KW or above sensible Cooling at ambient / outside 46°C	No.	6
6.2	Inrow DX Cooling Units with humidifier & dehumidifier- at least 24KW or above sensible Cooling at ambient / outside 46°C	No.	3
6.3	Front / top flow DX type CRAC units for Power Room (with heater and humidifier) - at least 20-30KW or above sensible Cooling at outside 46°C	No.	4
7	ENVIRONMENTAL MONITORING SYSTEM (EMS)	Lot	1
8	INTEGRATED DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM (DCIM)	Lot	1
9.1	Addressable Fire Detection Solution along with complete protective components	Lot	1
9.2	Fire Suppression Solution	Lot	1
9.3	VESDA - High Sensitivity smoke detector	Lot	1

10	Transformer- K-13 or above Transforer 630KVA or above with complete infrastructure and licensing from IESCO. All the expenses related to Transformers design, etc shall be borne by the Supplier.	No.	2
11	Gen-Set - with 630KVA/500KW Standby ratings, configuration in N+1 mode, Along with combines fuel tank for 24hours capacity	No.	2
12	Type Tested Form-3B, Low Voltage distribution Panels for Generator, Transformer, ATS, Power incoming and outgoing distribution on complete floor	Lot	2
13	Busway Trunking Distribution and power cables - for Complete incoming and outgoing power distribution - As required Ratings	Lot	1
14	Grounding / Earthing System	Lot	1
15	Active Lightening /Surge Protection solution	Lot	1
16	VRF Cooling System for complete Floor other than server room, Power Room only Including dual redundant inside units for MMR 150-170KW	Lot	1
B	**MISCELLANEOUS AND ANCILLARY WORK**		
1	IP Based Access Control System	Lot	1
2	IP Based CCTV System	Lot	1
3	Video Wall Displays	Lot	1
4	DIGITAL COLLABORATION SYSTEM FOR OFFICES and Conference ROOM	Lot	1
5	CABLE TRAY AND LADDER for Cables distribution in complete Facility	Lot	1
6	CABLE TRAY AND LADDER for Cables distribution in complete Facility	Lot	1
7	WIRING FOR LIGHTING & POWER SOCKETS	Lot	1
8	INTERNAL / EXTERNAL LIGHT FIXTURES	Lot	1
9	EMERGENCY / EXIT LIGHTING	Lot	1
10	STRUCTURED CABLING SYSTEM FOR DATA CENTER & OPERATIONS AREA	Lot	1
11	MISCELLANEOUS ITEMS, Rodent Repellent Solution, Thermal Shoe cover machine, Vacum cleaner, handheld Thermal camera etc.	Lot	1
C	**CIVIL AND INTERIOR WORKS**		
1	Brick & Plaster Work	Lot	1
2	Dismantling works at Complete First floor	Lot	1
3	Civil Structure Reinforcement of Ground and First floor	Lot	1
4	Modular Wall Partitioning	Lot	1
5.1	FIRE RATED DOORS - Size: 3’-6”X7’-6”	No.	11
5.2	Commercial Bullet proof glass door - Door Size: 5’ x 7’6” + 6’ x 7’6”(Two Leaf)	No.	2
5.3	Commercial Office grade wooden door - Size: 3’6" x 7'	No.	9

6	PAINT WORKS of Office Areas	Lot	1
7	FURNITURE AND FIXTURE WORKS	Lot	1
7.1	Conference Room:	Lot	1
7.2	Chief IT Room	Lot	1
7.3	Secretory IT Room	Lot	1
7.4	CISO Room	Lot	1
7.5	NOC Room:	Lot	1
7.6	SOC Room:	Lot	1
7.7	Networks Team Room:	Lot	1
7.8	Systems Team Room:	Lot	1
7.9	Kitchen Area	Lot	1
7.10	Spares equipment Room: 3 -Rooms	Lot	1
7.11	Reception Area:	Lot	1
8	SIGNAGE WORKS	Lot	1
9	FALSE CEILING AND FLOOR TILING WORKS	Lot	1
10	INTERIOR DESIGN WORKS	Lot	1
D	**Warranty & SLA for 5 Years**		
1	Warranty & SLA Cost of Complete DataCenter for Five Year	Lot	5
E	Items necessary for deployment of equipment in BoQ but not specifically mentioned (Electrical, Mechanical, small items etc.)	lump sum	1

Sr.#	**Equipment Details - DOT Lahore Site**	**U/M**	**Quantity**
A	Core Components		
1	IT racks 600x1070/1100 - EIA/TIA Compliant 16+10 racks for server room, 4 racks for MMRs, 2 Racks for staging room Networks racks 800x1070/1100 - EIA/TIA Compliant 2 Racks for Server room, 2 Racks for MMRs,	No.	26
1.1	Modular Fire Rated Hot / Cold Aisle Containment System for Server Room 20x racks and required cooling units. Compatible with OEM and third-party racks	Lot	1
2.1	Rack PDU - 32A - 7KW or above - Metered- Single Phase For server room only	No.	40

2.2	Rack PDU - 16A - 3KW or above - Metered- Single Phase 8x MMRs racks, 4x Staging rooms racks and 8x network racks	No.	10
3	120KW UPS, Hot Swappable, Modular Type UPS for IT Racks, 30-60KW module, 30 mints backup time, N+1 modules (N+1 Module), Li-Ion Batteries with Battery Management system	No.	2
4	Rack based Modular Power distribution for UPS output, (compatible to above mentioned PDUs) System Capacity: The PDU shall support provide 200-250 kW output	No.	2
5	UPS - For Facility Load 30KW or above UPS- Parallel for Power with VRLA batteries	No.	2
6.1	Inrow DX Cooling Units, without humidifier & dehumidifier- at least 24KW or above sensible Cooling at ambient / outside 46°C	No.	4
6.2	Inrow DX Cooling Units with humidifier & dehumidifier- at least 24KW or above sensible Cooling at ambient / outside 46°C	No.	2
6.3	Front / top flow DX type CRAC units for Power Room (with heater and humidifier) - at least 20-25KW or above sensible Cooling at ambient / outside 46°C	No.	4
7	ENVIRONMENTAL MONITORING SYSTEM (EMS)	Lot	1
8	INTEGRATED DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM (DCIM)	Lot	1
9.1	Addressable Fire Detection Solution along with complete protective components	Lot	1
9.2	Fire Suppression Solution	Lot	1
9.3	VESDA - High Sensitivity smoke detector	Lot	1
10	Transformer- K-13 or above Transforer 400KVA or above with complete infrastructure and licensing from IESCO. All the expenses related to transformers desing etc., shall be borne by the Supplier.	No.	2

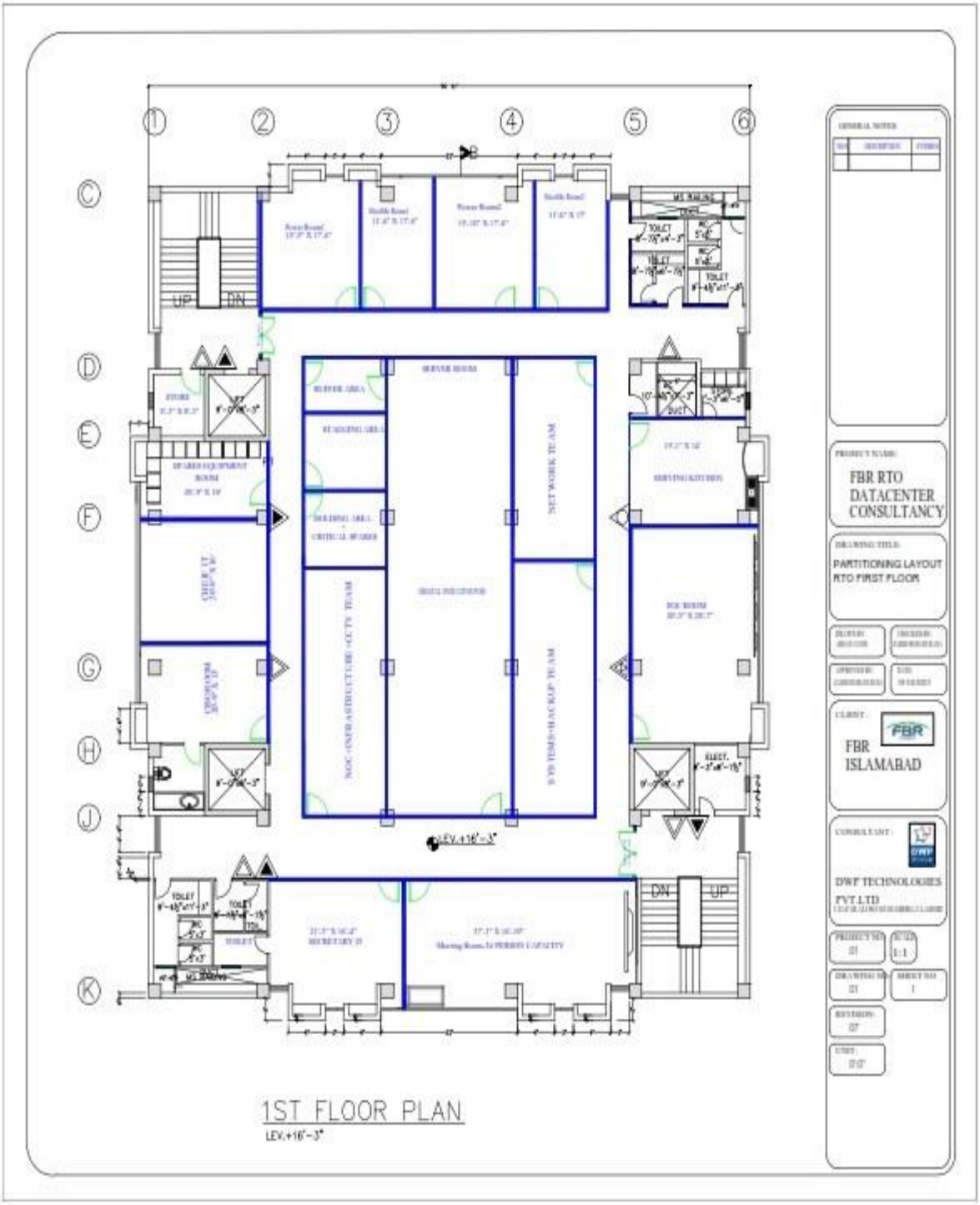
11	Gen-Set - with 400KVA/320KW Standby ratings, configuration in N+1 mode, Along with combines fuel tank for 24hours capacity	No.	2
12	Type Tested Form-2A, Low Voltage distribution Panels for Generator, Transformer, ATS, Power incoming and outgoing distribution on complete floor	Lot	2
13	Busway Trunking Distribution and power cables - for Complete incoming and outgoing power distribution - As required Ratings	Lot	1
14	Grounding / Earthing System	Lot	1
15	Active Lightening /Surge Protection solution	Lot	1
16	VRF Cooling System for complete Floor other than server room, Power Room only Including dual redundant inside units for MMR 60-70KW	Lot	1
B	MISCELLANEOUS AND ANCILLARY WORK		
1	IP Based Access Control System	Lot	1
2	IP Based CCTV System	Lot	1
3	Video Wall Displays	Lot	1
4	DIGITAL COLLABORATION SYSTEM FOR OFFICES and Conference ROOM	Lot	1
5	CABLE TRAY AND LADDER for Cables distribution in complete Facility	Lot	1
6	CABLE TRAY AND LADDER for Cables distribution in complete Facility	Lot	1
7	WIRING FOR LIGHTING & POWER SOCKETS	Lot	1
8	INTERNAL / EXTERNAL LIGHT FIXTURES	Lot	1

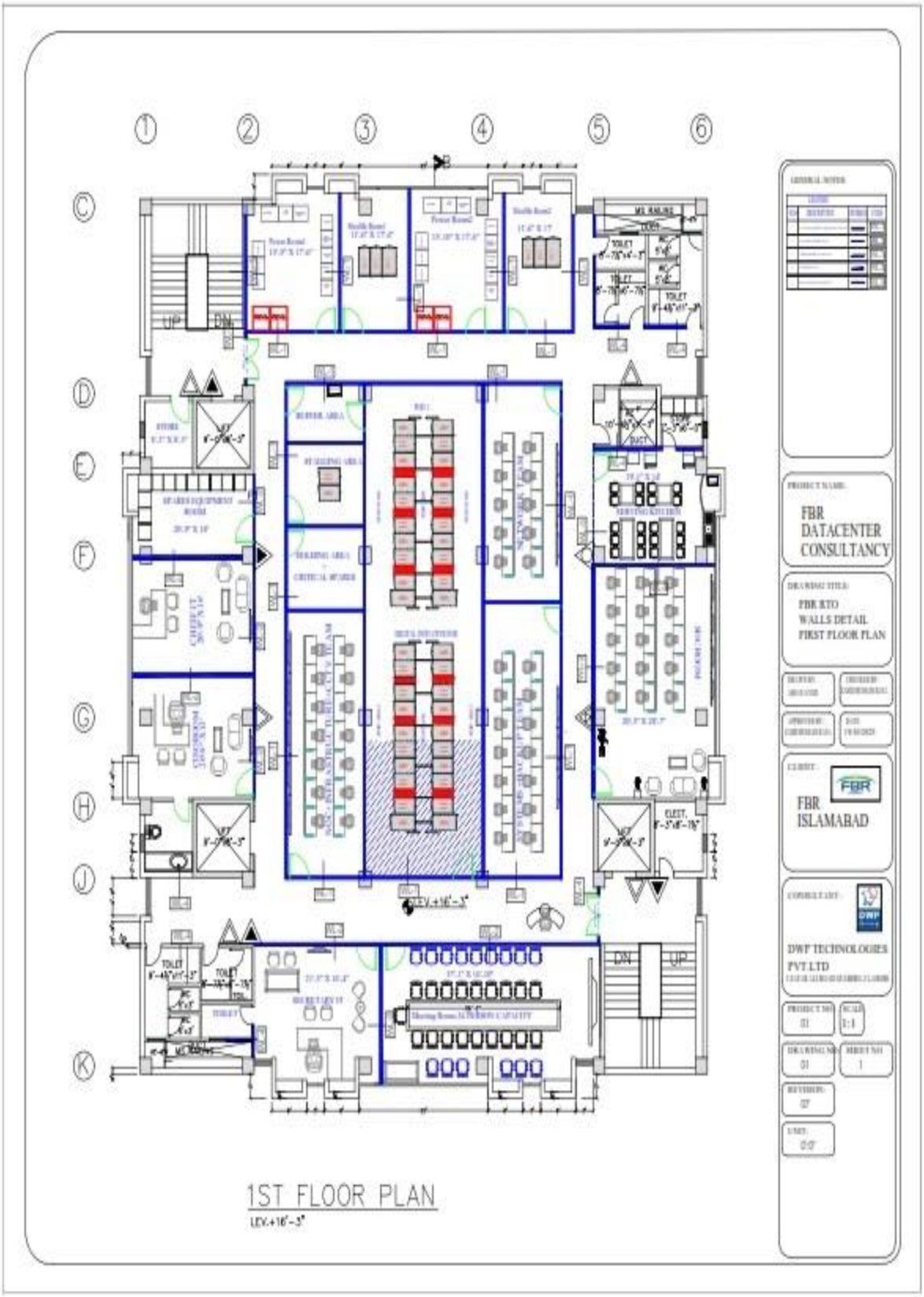
9	EMERGENCY / EXIT LIGHTING	Lot	1
10	STRUCTURED CABLING SYSTEM FOR DATA CENTER & OPERATIONS AREA	Lot	1
11	MISCELLANEOUS ITEMS, Rodent Repellent Solution, Thermal Shoe cover machine, Vacum cleaner, handheld Thermal camera etc.	Lot	1
C	CIVIL AND INTERIOR WORKS		
1	Brick & Plaster Work	Lot	1
2	Dismantling works at Complete Ground Floor	Lot	1
3	Modular Wall Partitioning	Lot	1
4.1	FIRE RATED DOORS - Size: 3’-6”X7’-6”	No.	7
4.2	Commercial Bullet proof glass door - Door Size: 6’ x 7’6”(Two Leaf)	No.	2
4.3	Commercial Office grade wooden door - Size: 3’6" x 7'	No.	2
5	PAINT WORKS of Office Areas	Lot	1
6	FURNITURE AND FIXTURE WORKS	Lot	1
6.1	Conference Room:	Lot	1
6.2	NOC + SOC Room:	Lot	1
6.3	Kitchen Area	Lot	1
6.4	Spares equipment Room:	Lot	1
6.5	Reception Area:	Lot	1
7	SIGNAGE WORKS	Lot	1

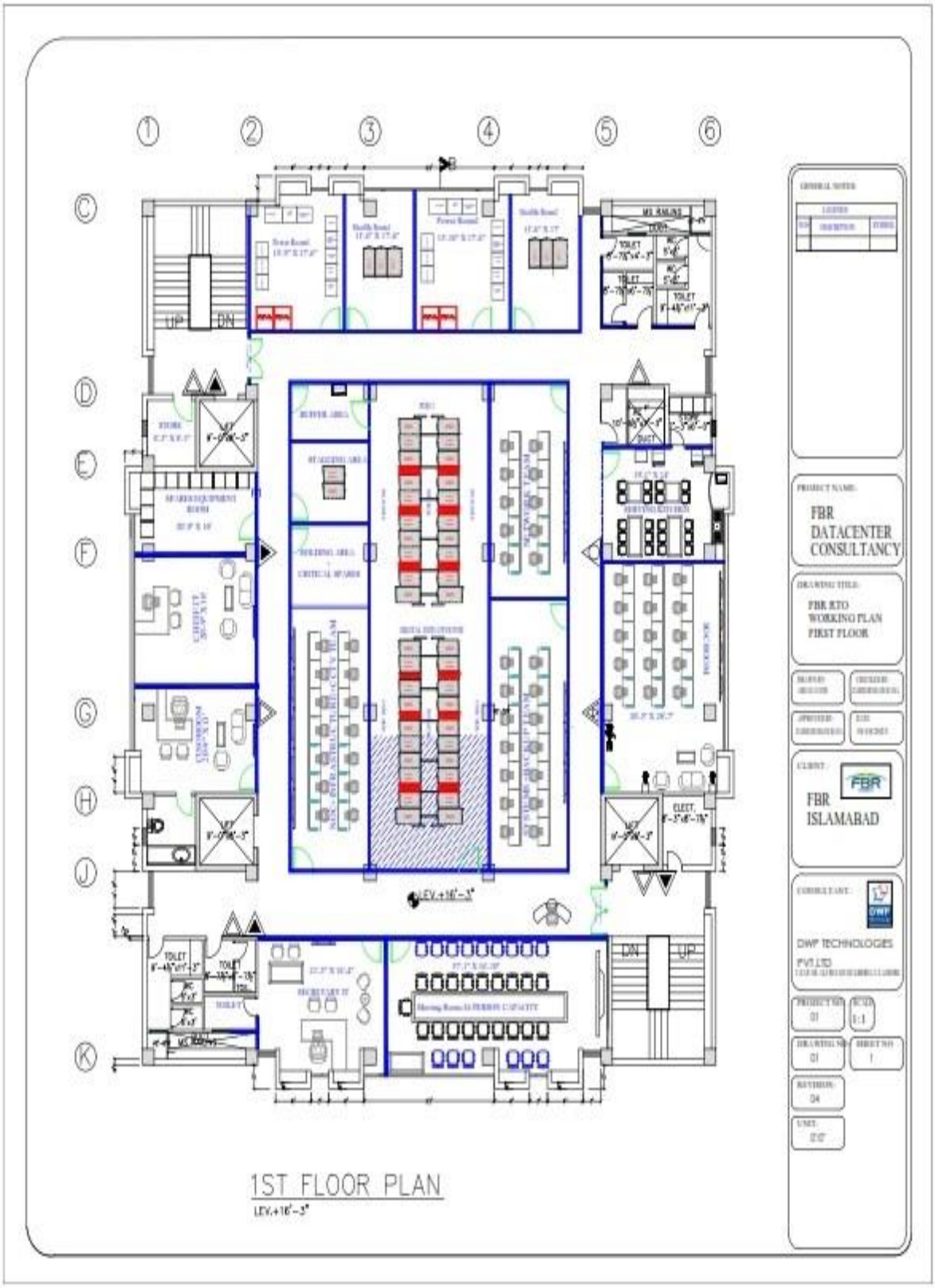
8	FALSE CEILING AND FLOOR TILING WORKS	Lot	1
9	INTERIOR DESIGN WORKS	Lot	1
D	Warranty & SLA for 5 Years		
1	Warranty & SLA Cost of Complete DataCenter for Five Year	Lot	1
E	Items necessary for deployment of equipment in BoQ but not specifically mentioned (Electrical, Mechanical, small items etc.)	lump sum	1

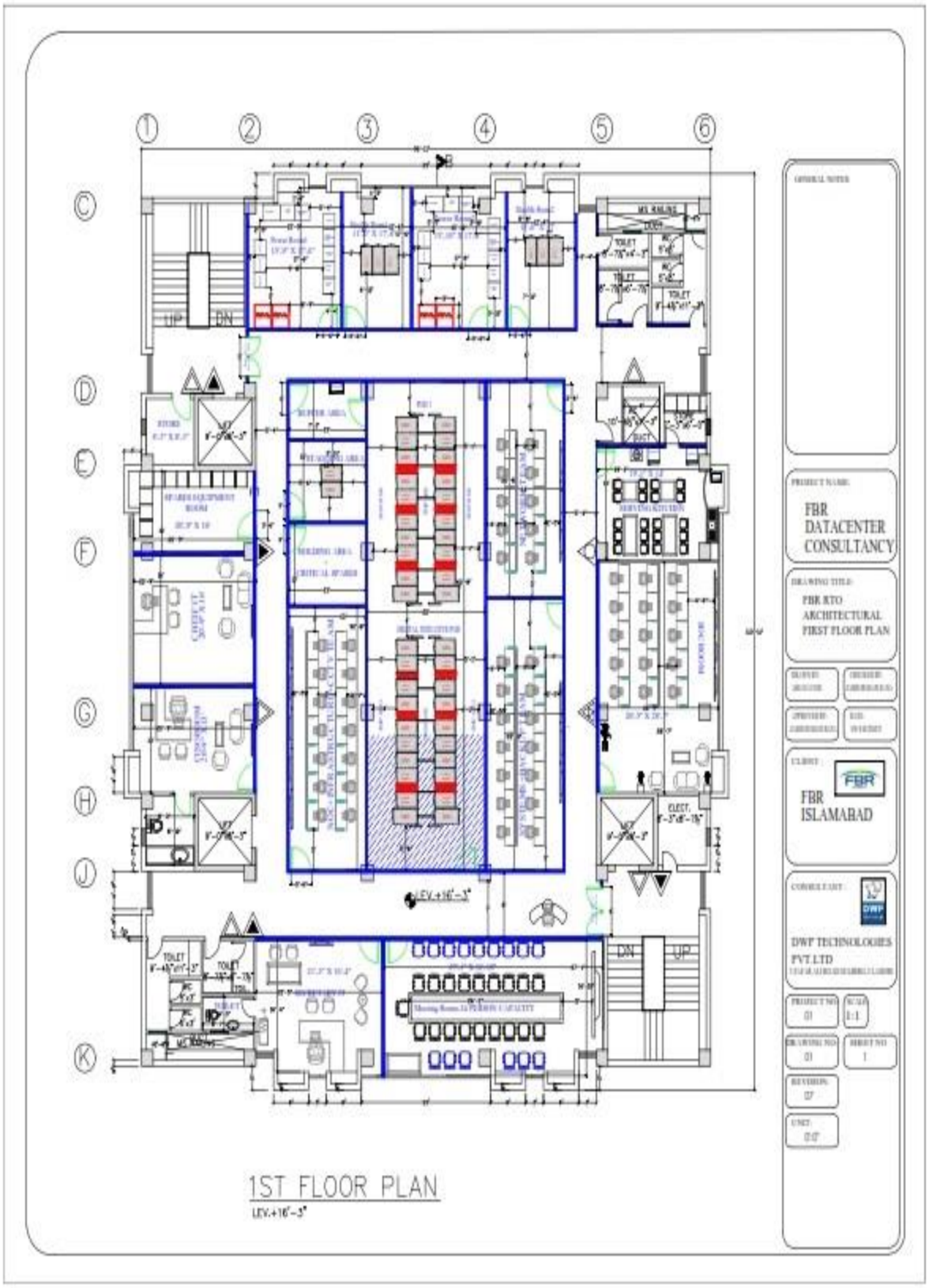
4. Drawings

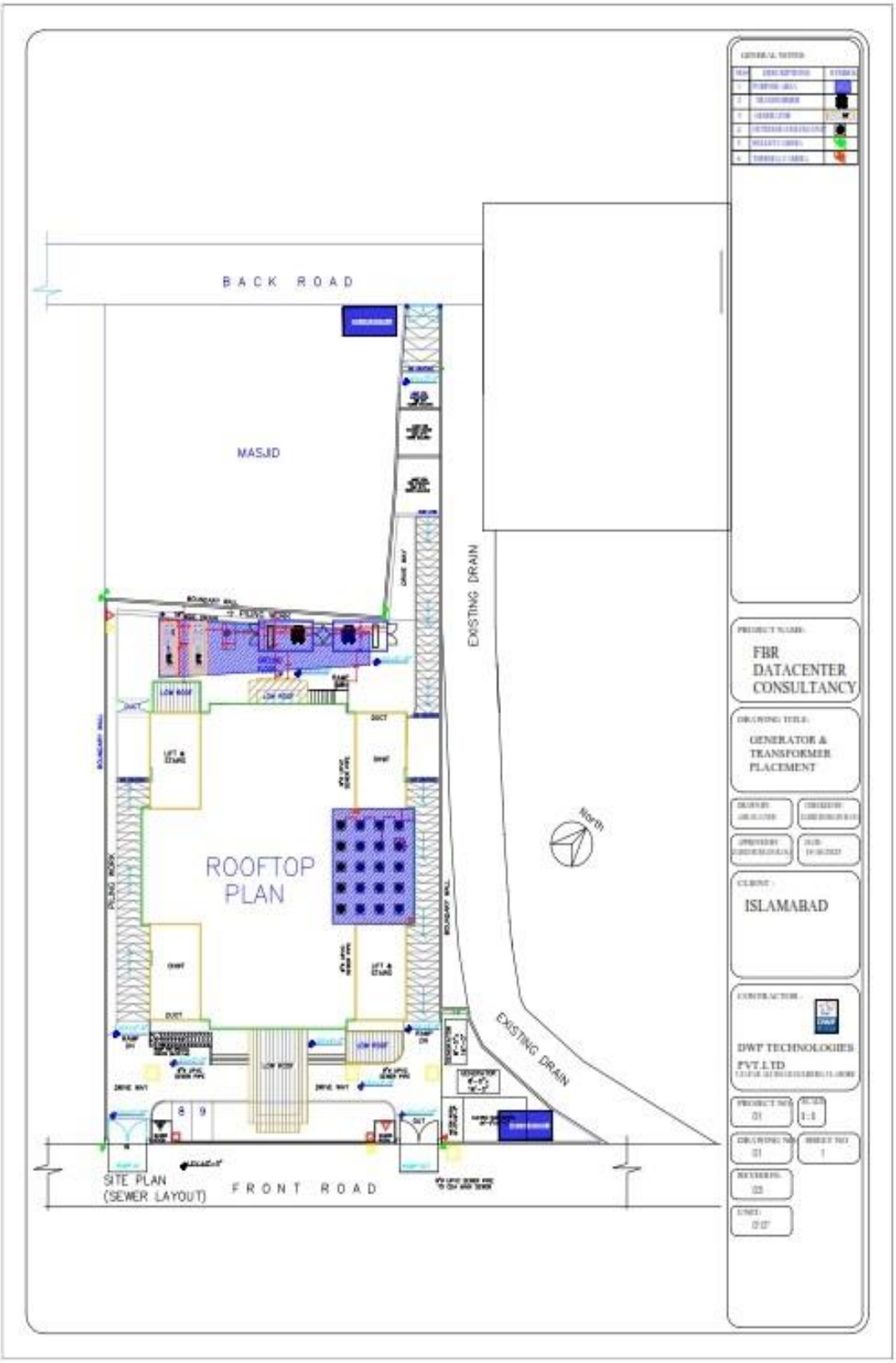
Regional Tax Office, Islamabad




1ST FLOOR PLAN
LEV.+16'-3"
FBR
DATACENTER
CONSULTANCY
FBR RTO
WALLS DETAIL
FIRST FLOOR PLAN
FBR
ISLAMABAD
DWF TECHNOLOGIES
PVT.LTD

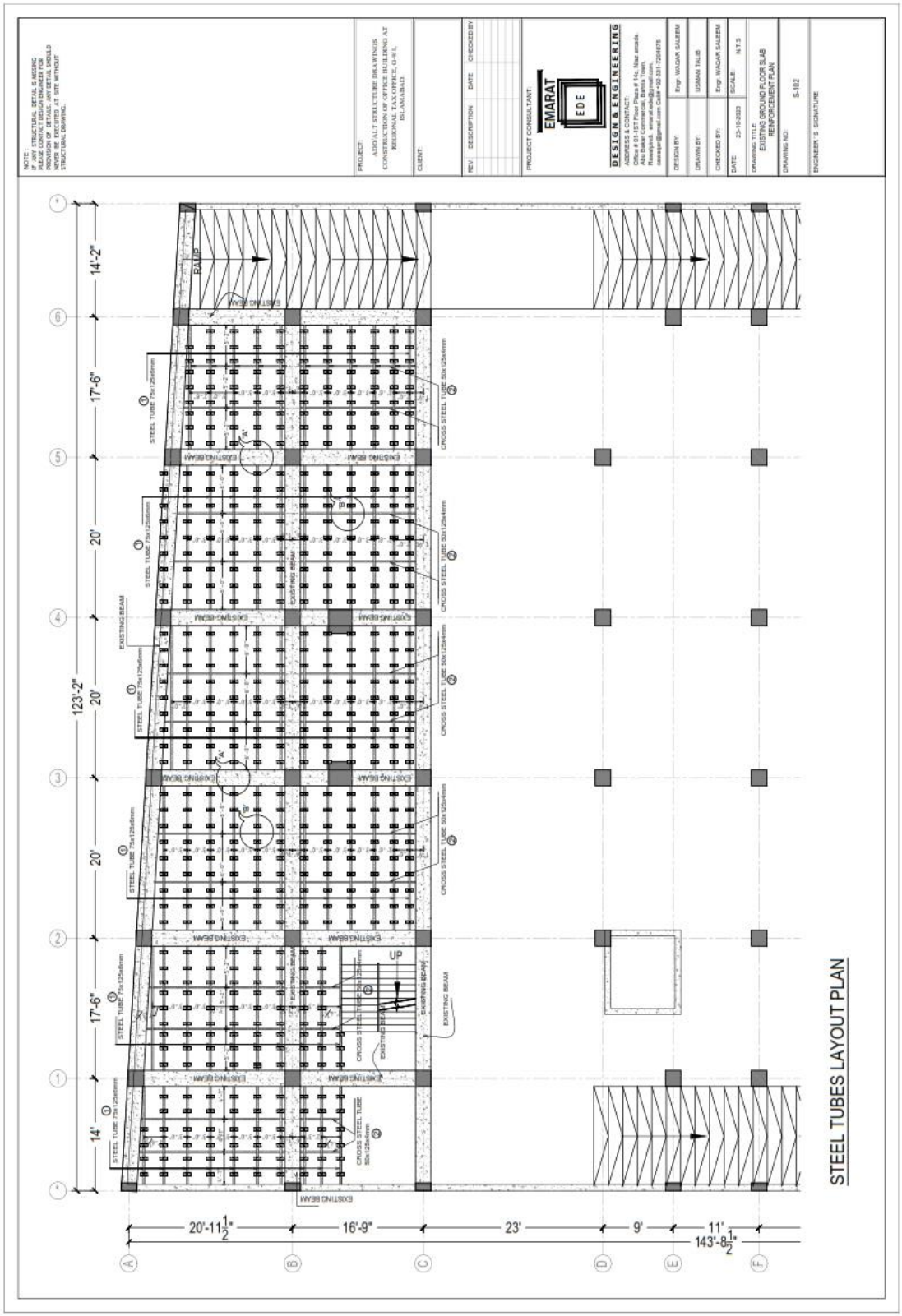

1
2
3
4
5
6
C
D
E
F
G
H
J
K
UP
DN
TOILET
FBR
DATACENTER
CONSULTANCY
FBR RTO
WORKING PLAN
FIRST FLOOR
FBR
ISLAMABAD
DWF TECHNOLOGIES
PVT LTD
1ST FLOOR PLAN
LEV.+16'-3"

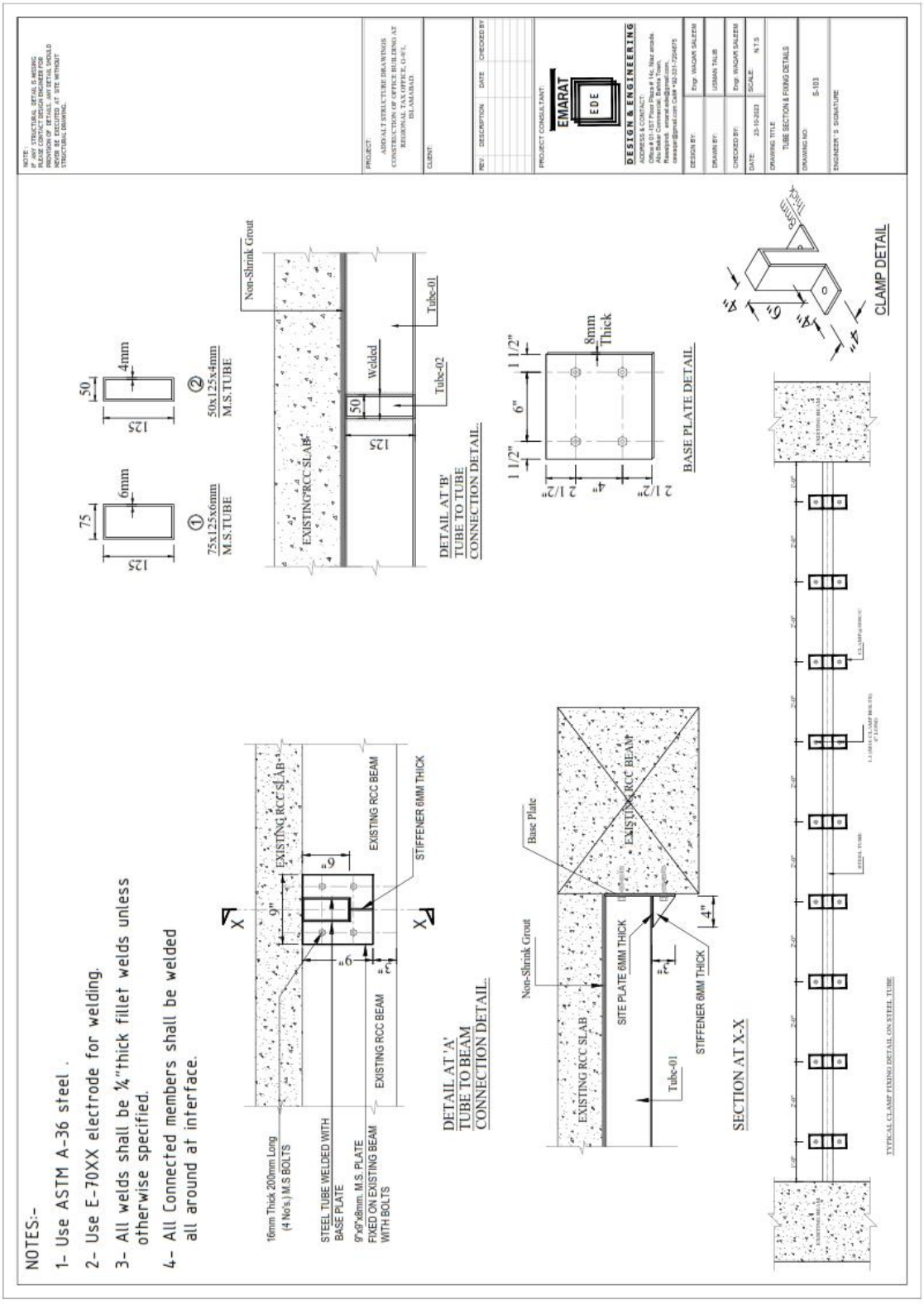

1
2
3
4
5
6
C
D
E
F
G
H
J
K
UP
DN
TOILET
ELECT.
LEV.+16'-3"
PROJECT NAME
FBR DATACENTER CONSULTANCY
DRAWING TITLE
FBR RTO ARCHITECTURAL FIRST FLOOR PLAN
CLIENT
FBR ISLAMABAD
CONSULTANT
DWP TECHNOLOGIES PVT.LTD
1ST FLOOR PLAN
LEV.+16'-3"

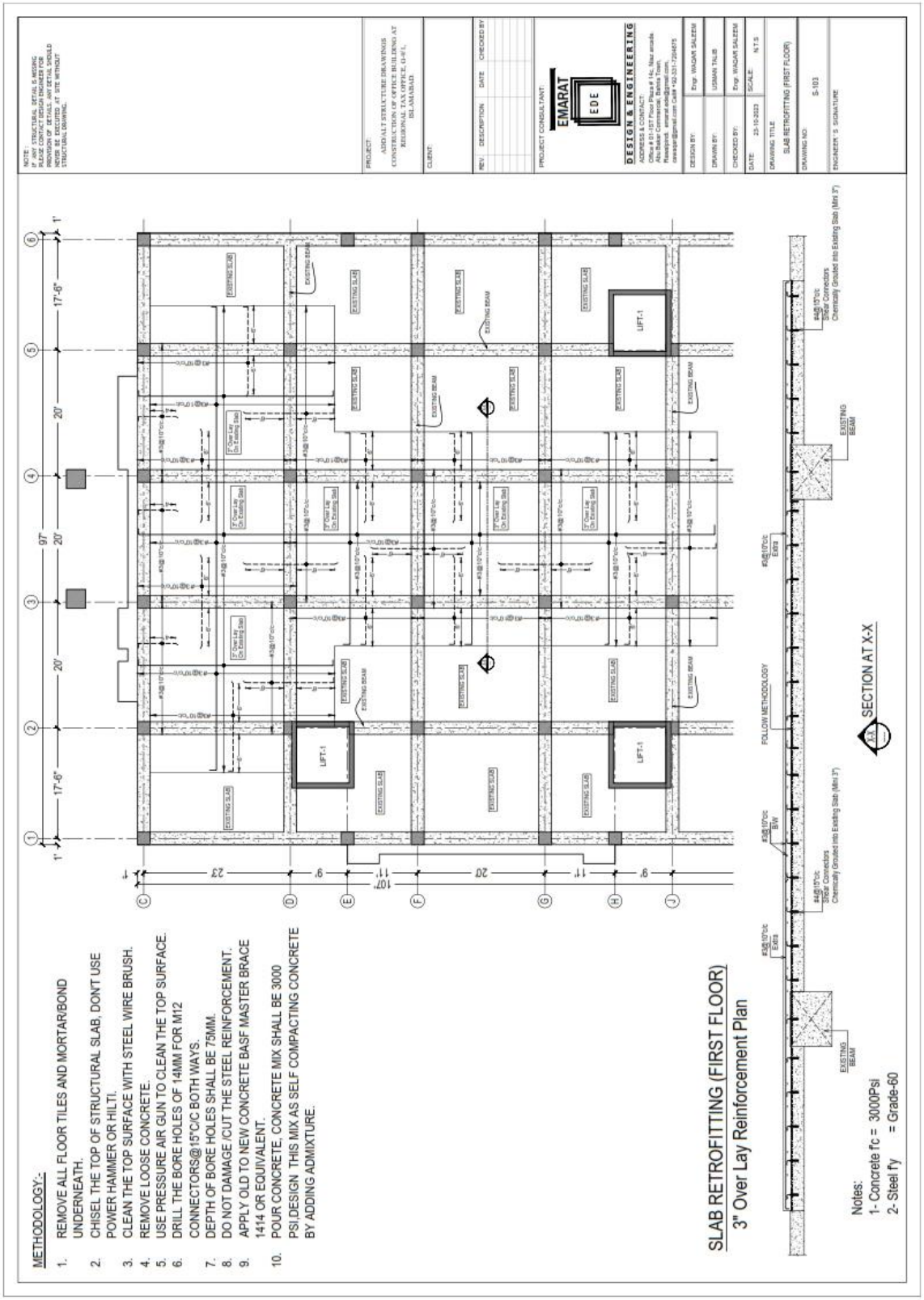

BACK ROAD
MASJID
EXISTING DRAIN
ROOFTOP PLAN
North
EXISTING DRAIN
SITE PLAN
(SEWER LAYOUT)
FRONT ROAD
FBR
DATACENTER
CONSULTANCY
GENERATOR &
TRANSFORMER
PLACEMENT
ISLAMABAD
DWP TECHNOLOGIES
PVT.LTD

Structural Retrofit Schemed

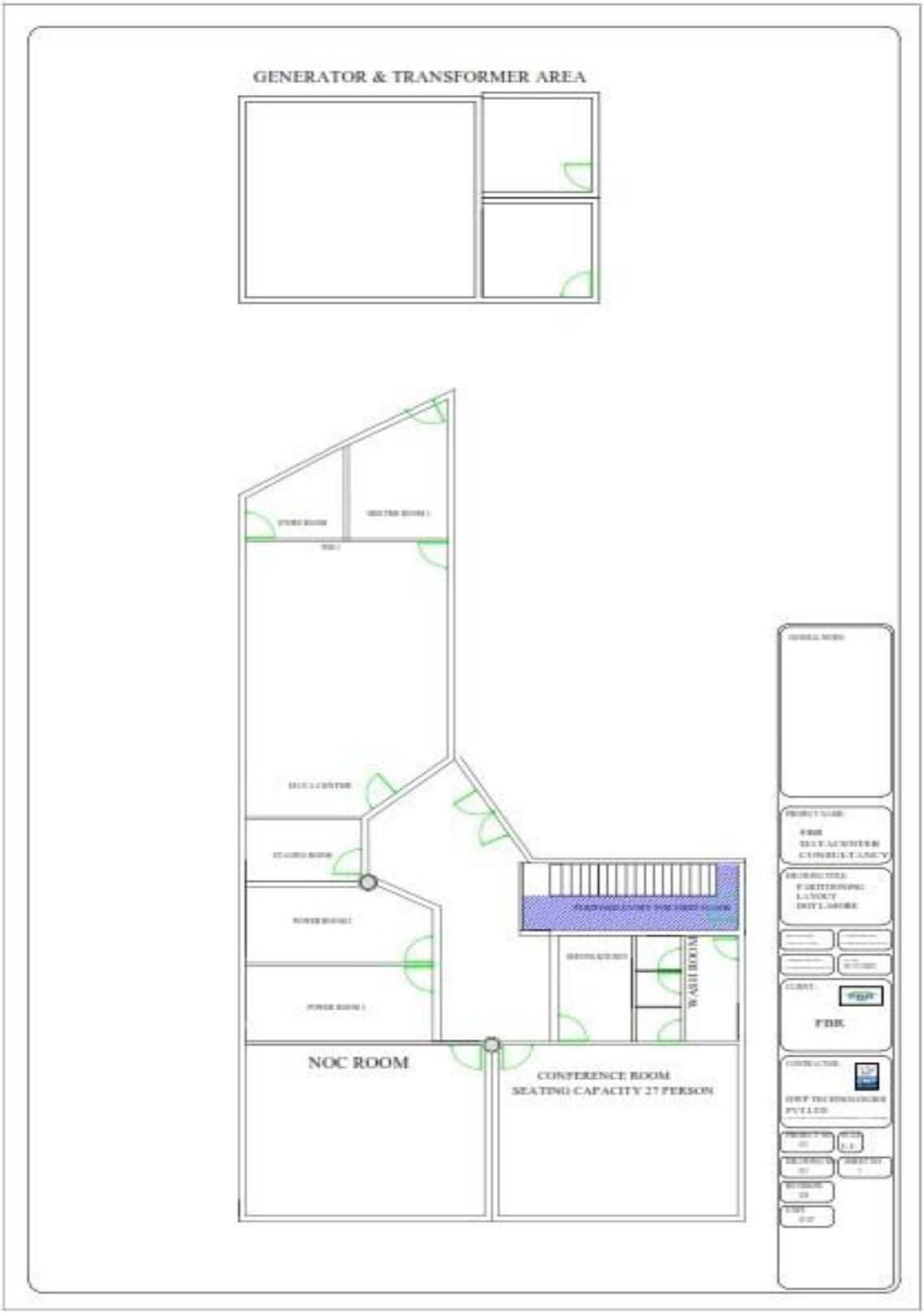
(Ground Floor Backyard Slab

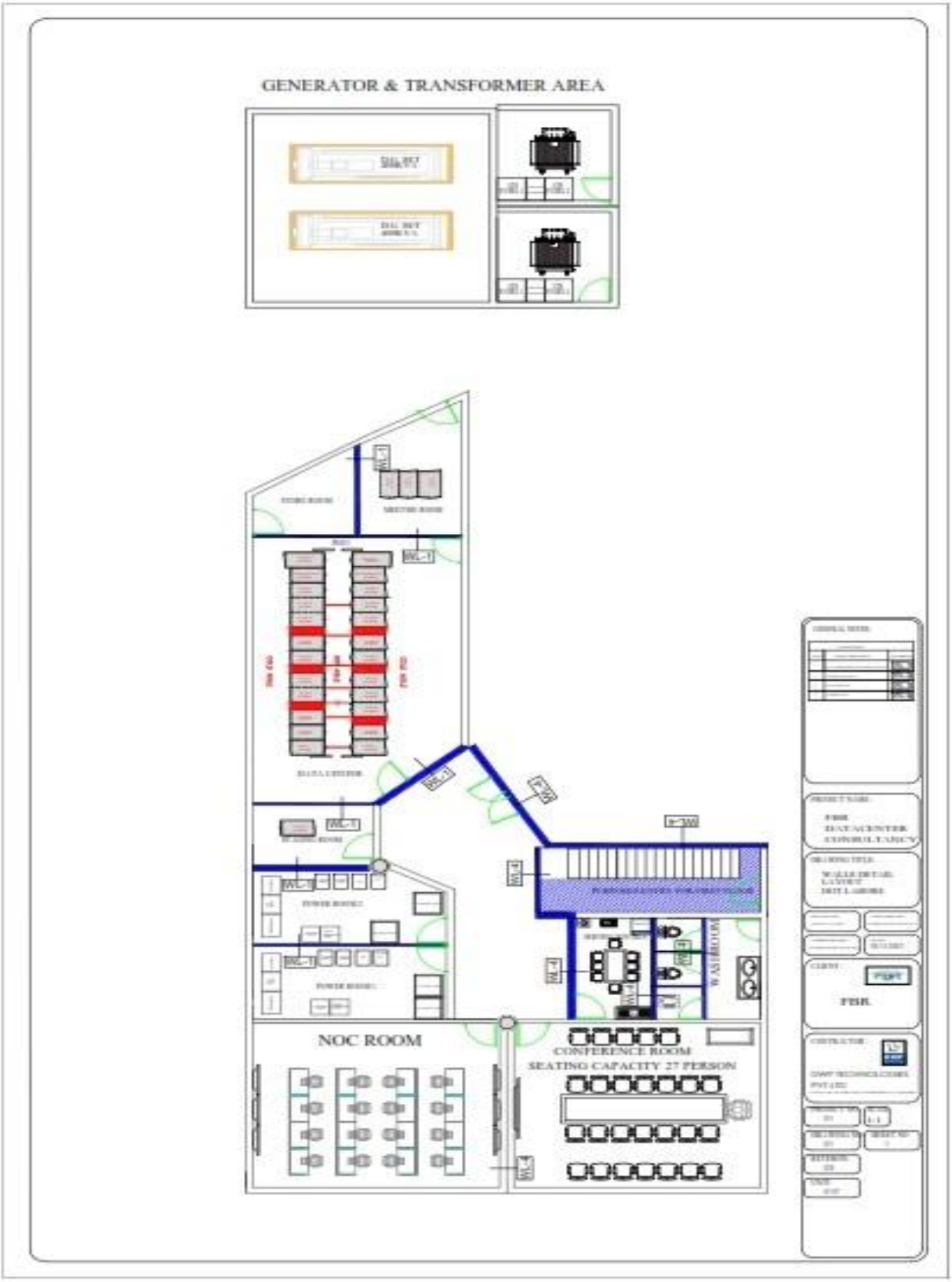

NOTE:
IF ANY STRUCTURAL DETAIL IS MISSING PLEASE CONTACT DESIGN ENGINEER FOR PROVIDING THE DETAIL. ANY WORK SHOULD NEVER BE EXECUTED AT SITE WITHOUT STRUCTURAL DRAWING.
PROJECT:
ADDITIONAL STRUCTURE DRAWINGS
CONSTRUCTION OF OFFICE BUILDING AT
REGIONAL TAX OFFICE, G-9/4,
ISLAMABAD.
CLIENT:
REV
DESCRIPTION
DATE
CHECKED BY
PROJECT CONSULTANT:
EMARAT
EDE
DESIGN & ENGINEERING
ADDRESS & CONTACT:
Office # 01, 1st Floor, Office # 14c, Near snack Abu Bakar Commercial, Bahria Town, Rawalpindi. emarat.edd@gmail.com
DESIGN BY:
Engr. WAQAR SALEEM
DRAWN BY:
USMAN TALIB
CHECKED BY:
Engr. WAQAR SALEEM
DATE:
23-10-2023
SCALE:
N.T.S
DRAWING TITLE:
EXISTING GROUND FLOOR SLAB REINFORCEMENT PLAN
DRAWING NO:
S-102
ENGINEER'S SIGNATURE
STEEL TUBES LAYOUT PLAN
123'-2"
14'-2"
17'-6"
20'
14'
20'-11½"
16'-9"
23'
9'
11'
143'-8½"
RAMP
UP
EXISTING BEAM
STEEL TUBE 75x125x6mm
CROSS STEEL TUBE 50x125x4mm

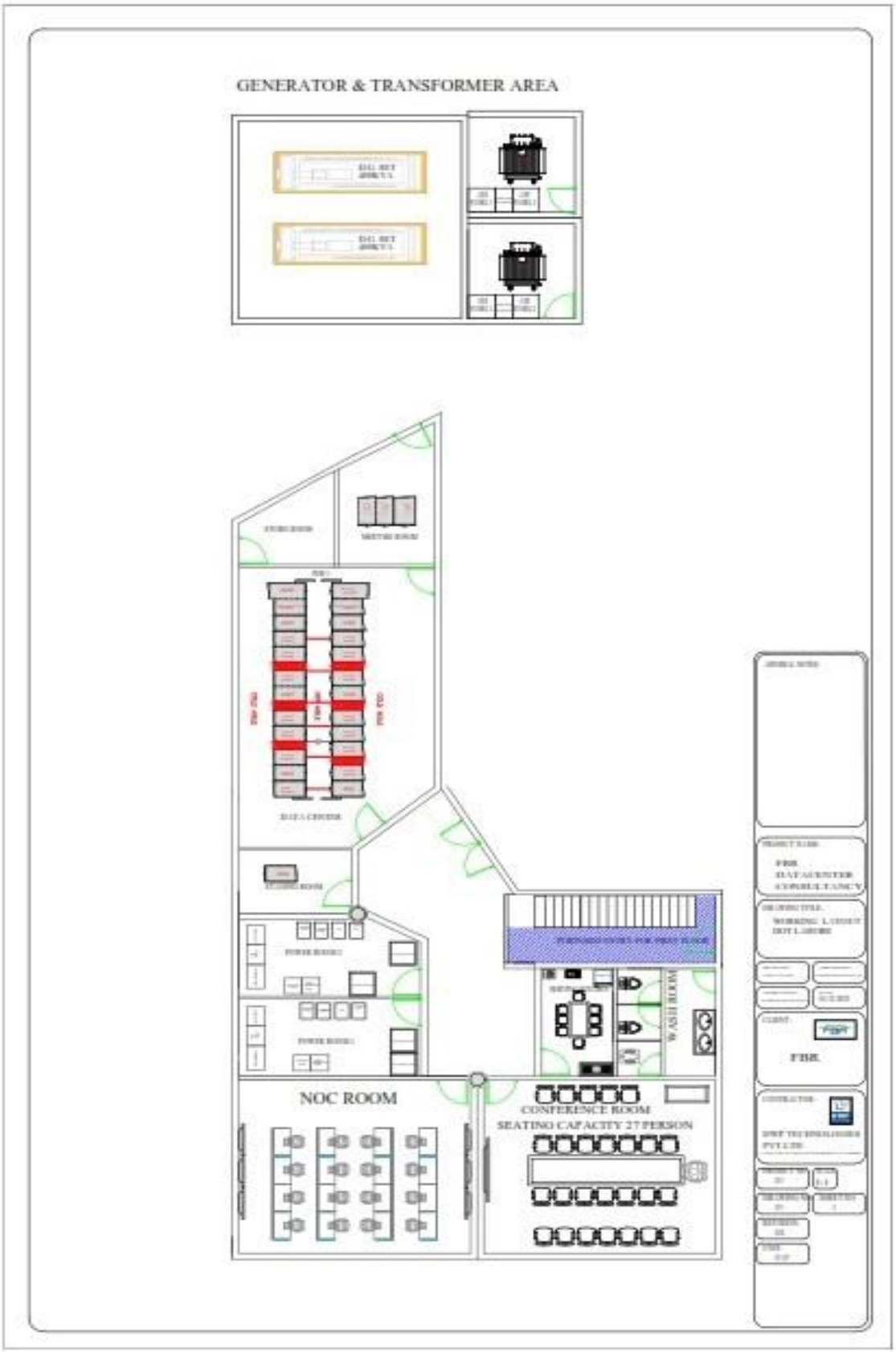

NOTES:-
1- Use ASTM A-36 steel .
2- Use E-70XX electrode for welding.
3- All welds shall be ¼"thick fillet welds unless otherwise specified.
4- All Connected members shall be welded all around at interface.
75x125x6mm M.S.TUBE
50x125x4mm M.S.TUBE
Non-Shrink Grout
EXISTING RCC SLAB
Welded
Tube-01
Tube-02
DETAIL AT 'B' TUBE TO TUBE CONNECTION DETAIL.
8mm Thick
BASE PLATE DETAIL
CLAMP DETAIL
16mm Thick 200mm Long (4 No's.) M.S BOLTS
STEEL TUBE WELDED WITH BASE PLATE
9"x9"x8mm. M.S. PLATE FIXED ON EXISTING BEAM WITH BOLTS
EXISTING RCC BEAM
STIFFENER 6MM THICK
DETAIL AT 'A' TUBE TO BEAM CONNECTION DETAIL.
Base Plate
SITE PLATE 6MM THICK
SECTION AT X-X
TYPICAL CLAMP FIXING DETAIL ON STEEL TUBE
EMARAT
DESIGN & ENGINEERING
DESIGN BY: Engr. WAQAR SALEEM
DRAWN BY: USMAN TALIB
CHECKED BY: Engr. WAQAR SALEEM
DATE: 23-10-2023
SCALE: N.T.S
DRAWING TITLE: TUBE SECTION & FIXING DETAILS
DRAWING NO: S-103
ENGINEER'S SIGNATURE

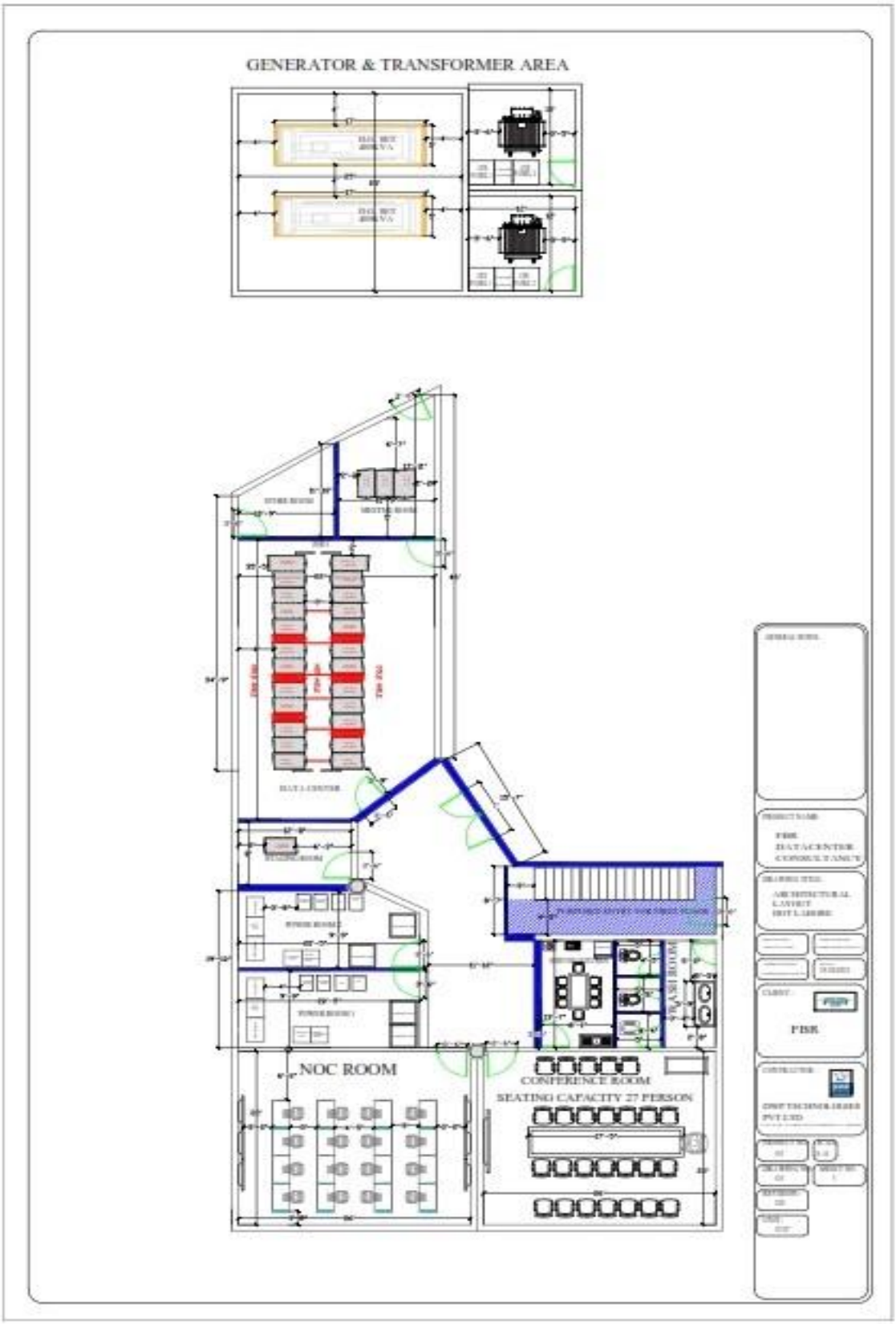

METHODOLOGY:-
1. REMOVE ALL FLOOR TILES AND MORTAR/BOND UNDERNEATH.
2. CHISEL THE TOP OF STRUCTURAL SLAB, DON'T USE POWER HAMMER OR HILTI.
3. CLEAN THE TOP SURFACE WITH STEEL WIRE BRUSH.
4. REMOVE LOOSE CONCRETE.
5. USE PRESSURE AIR GUN TO CLEAN THE TOP SURFACE.
6. DRILL THE BORE HOLES OF 14MM FOR M12 CONNECTORS@15"C/C BOTH WAYS.
7. DEPTH OF BORE HOLES SHALL BE 75MM.
8. DO NOT DAMAGE /CUT THE STEEL REINFORCEMENT.
9. APPLY OLD TO NEW CONCRETE BASF MASTER BRACE 1414 OR EQUIVALENT.
10. POUR CONCRETE, CONCRETE MIX SHALL BE 3000 PSI,DESIGN THIS MIX AS SELF COMPACTING CONCRETE BY ADDING ADMIXTURE.
SLAB RETROFITTING (FIRST FLOOR)
3" Over Lay Reinforcement Plan
Notes:
1- Concrete fc = 3000Psi
2- Steel fy = Grade-60
SECTION AT X-X
FOLLOW METHODOLOGY
EXISTING BEAM
EXISTING SLAB
LIFT-1
17'-6"
20'
97'
107'
23'
9'
11'
20'
PROJECT:
ADD/ALT STRUCTURE DRAWINGS
CONSTRUCTION OF OFFICE BUILDING AT
RESIDENCY TOWER, G-9/1,
ISLAMABAD.
CLIENT:
PROJECT CONSULTANT:
EMARAT
DESIGN & ENGINEERING
DESIGN BY: Engr. WAQAR SALEEM
DRAWN BY: USMAN TALIB
CHECKED BY: Engr. WAQAR SALEEM
DATE: 25-10-2023
SCALE: N.T.S
DRAWING TITLE:
SLAB RETROFITTING (FIRST FLOOR)
DRAWING NO: S-103
ENGINEER'S SIGNATURE:

Directorate of Training
Lahore


GENERATOR & TRANSFORMER AREA
NOC ROOM
CONFERENCE ROOM
SEATING CAPACITY 27 PERSON
FBR


GENERATOR & TRANSFORMER AREA
NOC ROOM
CONFERENCE ROOM
SEATING CAPACITY 27 PERSON
WASHROOM
FSR


GENERATOR & TRANSFORMER AREA
NOC ROOM
CONFERENCE ROOM
SEATING CAPACITY 27 PERSON
WASH ROOM
FSP


GENERATOR & TRANSFORMER AREA
NOC ROOM
CONFERENCE ROOM
SEATING CAPACITY 27 PERSON
PISR

5. Inspections and Tests

The following inspections and tests shall be performed:

Inspections: The equipment subsystems shall be inspected at the factory and be certified by one expert selected by the purchaser and by two (2) Purchaser representatives before shipment. The cost for inspection and testing will be the responsibility of the Bidder, including the costs of travelling of the expert and Purchaser representatives.

Tests:

- Factory and On-Site acceptance tests.
- There shall be an acceptance test performed after installation of the equipment to demonstrate equipment conformity to all the technical requirements listed in this document.
- After installation and during commission, the Supplier shall demonstrate that the scanner meets all the technical Specifications.
- The Supplier shall demonstrate performance of the scanner in conformity with the relevant standards, using the appropriate testing tools.
- The Supplier shall demonstrate to Purchaser all features requested in the technical specifications.
- A test protocol draft is to be submitted to Purchaser for approval, latest 2 months from the signature of the procurement contract. Purchaser may ask for protocol draft amendment in order to fulfil the above-mentioned requirements.
- All equipment and materials needed for the tests shall be provided by the Supplier at its own costs.
- The cost for inspection and testing will be the responsibility of the Supplier, including the costs for the travelling expenses.

At the end of the Site Acceptance Test; the Supplier and Purchaser will sign the site Acceptance Certificate, listing all results and reserves. In this document the schedule for correction of the reserves shall be explicitly indicated

PART 3 – Contract

Section VIII - General Conditions of Contract

Table of Clauses

Section VIII. General Conditions of Contract

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

(a) "Bank" means the World Bank and refers to the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).

(b) "Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.

(c) "Contract Documents" means the documents listed in the Contract Agreement, including any amendments thereto.

(d) "Contract Price" means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

(e) "Day" means calendar day.

(f) "Completion" means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.

(g) "GCC" means the General Conditions of Contract.

(h) "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.

(i) "Purchaser's Country" is the country specified **in the Special Conditions of Contract** (SCC).

(j) "Purchaser" means the entity purchasing the Goods and Related Services, as **specified in the SCC.**

(k) "Related Services" means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other such obligations of the Supplier under the Contract.

(l) "SCC" means the Special Conditions of Contract.

(m) "SubSupplier" means any person, private or government entity, or a combination of the above, to whom any part of

the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.

(n) "Supplier" means the person, private or government entity, or a combination of the above, whose Bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.

(o) "The Project Site," where applicable, means the place **named in the SCC.**

2. Contract Documents

2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.

3. Fraud and Corruption

3.1 The Bank requires compliance with the Bank's Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework, as set forth in Appendix 1 to the GCC.

3.2 The Purchaser requires the Supplier to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the Bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

4. Interpretation

4.1 If the context so requires it, singular means plural and vice versa.

4.2 Incoterms

(a) 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 **specified in the SCC**.

(b) The terms EXW, CIP, FCA, CFR and other similar terms, when used, shall be governed by the rules prescribed in the current edition of Incoterms **specified in the SCC** and published by the International Chamber of Commerce in Paris, France.

4.3 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the date of Contract.

4.4 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto.

4.5 Nonwaiver

(a) Subject to GCC Sub-Clause 4.5(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, neither 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, 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.

4.6 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.

5. Language

5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be written in the language specified in the **SCC.** Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified**,** in which case, for purposes of interpretation of the Contract, this translation shall govern.

5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.

6. Joint Venture, Consortium or Association

6.1 If the Supplier is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The composition or the constitution of the joint venture, consortium, or association shall not be altered without the prior consent of the Purchaser.

7. Eligibility

7.1 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.

7.2 All Goods and Related Services to be supplied under the Contract and financed by the Bank shall have their origin in Eligible Countries. For the purpose of this Clause, origin means the country where the goods have been grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

8. Notices

8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address **specified in the SCC.** The term "in writing" means communicated in written form with proof of receipt.

8.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

9. Governing Law

9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Purchaser's Country, unless otherwise **specified in the SCC.**

9.2 Throughout the execution of the Contract, the Supplier shall comply with the import of goods and services prohibitions in the Purchaser's Country when:

(a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country; or

(b) 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, the Borrower's Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

10. Settlement of Disputes

10.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter

provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC.**

10.3 Notwithstanding any reference to arbitration herein,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and

(b) the Purchaser shall pay the Supplier any monies due the Supplier.

11. Inspections and Audit by the Bank

11.1 The Supplier shall keep, and shall make all reasonable efforts to cause its Subcontractors and subconsultants to keep, accurate and systematic accounts and records in respect of the Goods in such form and details as will clearly identify relevant time changes and costs.

11.2 Pursuant to paragraph 2.2 e. of Appendix 1 to the General Conditions the Supplier shall permit and shall cause its agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit, the Bank and/or persons appointed by the Bank to inspect the site and/or the accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have such accounts, records and other documents audited by auditors appointed by the Bank. The Supplier's and its Subcontractors' and subconsultants' attention is drawn to Sub-Clause 3.1 (Fraud and Corruption) which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

12. Scope of Supply

12.1 The Goods and Related Services to be supplied shall be as specified in the Schedule of Requirements.

13. Delivery and Documents

13.1 Subject to GCC Sub-Clause 33.1, the Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of

Requirements. The details of shipping and other documents to be furnished by the Supplier are **specified in the SCC.**

14. Supplier's Responsibilities

14.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with GCC Clause 12, and the Delivery and Completion Schedule, as per GCC Clause 13.

14.2 The Supplier, including its Subcontractors, shall not employ or engage forced labor or persons subject to trafficking, as described in GCC Sub-Clauses 14.3 and 14.4.

14.3 Forced labor consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements.

14.4 Trafficking in persons is defined as the recruitment, transportation, transfer, harbouring or receipt of persons by means of the threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purposes of exploitation.

14.5 The Supplier, including its Subcontractors, shall not employ or engage a child under the age of 14 unless the national law specifies a higher age (the minimum age).

14.6 The Supplier, including its Subcontractors, shall not employ or engage a child between the minimum age and the age of 18 in a manner that is likely to be hazardous, 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.

14.7 Work considered hazardous for children is work that, by its nature or the circumstances in which it is carried out, is likely to jeopardize the health, safety, or morals of children. Such work activities prohibited for children include work:

(a) with exposure to physical, psychological or sexual abuse;

(b) underground, underwater, working at heights or in confined spaces;

(c) with dangerous machinery, equipment or tools, or involving handling or transport of heavy loads;

(d) in unhealthy environments exposing children to hazardous substances, agents, or processes, or to temperatures, noise or vibration damaging to health; or

(e) under difficult conditions such as work for long hours, during the night or in confinement on the premises of the employer.

14.8 The Supplier shall comply, and shall require its Subcontractors if any to comply, with all applicable health and safety regulations, laws, guidelines, and any other requirement stated in the Technical Specifications.

14.9 **Pursuant to the SCC**, the Supplier, including its Subcontractors/ suppliers/ manufacturers shall take all technical and organizational measures necessary to protect the information technology systems and data used in connection with the Contract. Without limiting the foregoing, the Supplier, including its Subcontractors/ suppliers/ manufacturers, shall use all reasonable efforts to establish, maintain, implement and comply with, reasonable information technology, information security, cyber security and data protection controls, policies and procedures, including oversight, access controls, encryption, technological and physical safeguards and business continuity/disaster recovery and security plans that are designed to protect against and prevent breach, destruction, loss, unauthorized distribution, use, access, disablement, misappropriation or modification, or other compromise or misuse of or relating to any information technology system or data used in connection with the Contract.

14.10 The Supplier shall comply with additional obligations as **specified in the SCC.**

15. Contract Price

15.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its Bid, with the exception of any price adjustments **authorized in the SCC.**

16. Terms of Payment

16.1 The Contract Price, including any Advance Payments, if applicable, shall be paid as **specified in the SCC.**

16.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to GCC Clause 13 and upon fulfillment of all other obligations stipulated in the Contract.

16.3 Payments shall be made promptly by the Purchaser, but in no case later than sixty (60) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.

16.4 The currencies in which payments shall be made to the Supplier under this Contract shall be those in which the Bid price is expressed.

16.5 In the event that the Purchaser fails to pay the Supplier any payment by its due date or within the period **set forth in the SCC,** the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate **shown in the SCC,** for the period of delay until payment has been made in full, whether before or after judgment or arbitrage award.

17. Taxes and Duties

17.1 For goods manufactured outside the Purchaser's Country, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's Country.

17.2 For goods Manufactured within the Purchaser's Country, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.

17.3 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in the Purchaser's Country, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

18. Performance Security

18.1 If required as specified in the SCC, the Supplier shall, within twenty-eight (28) days of the notification of contract award, provide a performance security for the performance of the Contract in the amount **specified in the SCC.**

18.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

18.3 As specified in the SCC, the Performance Security, if required, shall be denominated in the currency (ies) of the Contract, or in a freely convertible currency acceptable to the Purchaser; and shall be in one of the format stipulated by the **Purchaser in the SCC,** or in another format acceptable to the Purchaser.

18.4 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless **specified otherwise in the SCC.**

19. Copyright

19.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if

they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

20. Confidential Information

20.1 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data, or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under GCC Clause 20.

20.2 The Purchaser shall not use such documents, data, and other information received from the Supplier for any purposes unrelated to the contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the performance of the Contract.

20.3 The obligation of a party under GCC Sub-Clauses 20.1 and 20.2 above, however, shall not apply to information that:

(a) the Purchaser or Supplier need to share with the Bank or other institutions participating in the financing of the Contract;

(b) now or hereafter enters the public domain through no fault of that party;

(c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or

(d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

20.4 The above provisions of GCC Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Supply or any part thereof.

20.5 The provisions of GCC Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

21. Subcontracting

21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the Bid. Notification by the Supplier, for addition of any Subcontractor not named in the Contract, shall also include the Subcontractor's declaration in accordance with Appendix 2 to the GCC- Sexual exploitation and Abuse (SEA) and/or Sexual Harassment (SH) Performance Declaration. Such notification, in the original Bid or later shall not relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

21.2 Subcontracts shall comply with the provisions of GCC Clauses 3 and 7.

22. Specifications and Standards

22.1 Technical Specifications and Drawings

(a) The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards mentioned in Section VI, Schedule of Requirements and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the Goods' country of origin.

(b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.

(c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with GCC Clause 33.

23. Packing and Documents

23.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where

appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

23.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, **specified in the SCC,** and in any other instructions ordered by the Purchaser.

24. Insurance

24.1 Unless otherwise **specified in the SCC,** the Goods supplied under the Contract shall be fully insured—in a freely convertible currency from an eligible country—against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the **SCC.**

25. Transportation and Incidental Services

25.1 Unless otherwise **specified in the SCC,** responsibility for arranging transportation of the Goods shall be in accordance with the specified Incoterms.

25.2 The Supplier may be required to provide any or all of the following services, including additional services, if any, **specified in SCC:**

(a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;

(b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;

(c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;

(d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and

(e) training of the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.

25.3 Prices charged by the Supplier for incidental services, if not included in the Contract Price for the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services

26. Inspections and Tests

26.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are **specified in the SCC.**

26.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the Goods' final destination, or in another place in the Purchaser's Country as **specified in the SCC.** Subject to GCC Sub-Clause 26.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

26.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in GCC Sub-Clause 26.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

26.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

26.5 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.

26.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.

26.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall

repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to GCC Sub-Clause 26.4.

26.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to GCC Sub-Clause 26.6, shall release the Supplier from any warranties or other obligations under the Contract.

27. Liquidated Damages

27.1 Except as provided under GCC Clause 32, if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage **specified in the SCC** of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage **specified in those SCC.** Once the maximum is reached, the Purchaser may terminate the Contract pursuant to GCC Clause 35.

28. Warranty

28.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

28.2 Subject to GCC Sub-Clause 22.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

28.3 Unless otherwise **specified in the SCC,** the warranty shall remain valid for twelve (12) months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination **indicated in the SCC,** or for eighteen (18) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.

28.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.

28.5 Upon receipt of such notice, the Supplier shall, within the period **specified in the SCC,** expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.

28.6 If having been notified, the Supplier fails to remedy the defect within the period **specified in the SCC,** the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

29. Patent Indemnity

29.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 29.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:

(a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and

(b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

29.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 29.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

29.3 If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.

29.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

29.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

30. Limitation of Liability

30.1 Except in cases of criminal negligence or willful misconduct,

(a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser and

(b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the supplier to indemnify the Purchaser with respect to patent infringement

31. Change in Laws and Regulations

31.1 Unless otherwise specified in the Contract, if after the date of 28 days prior to date of Bid submission, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in the place of the Purchaser's Country where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already

been accounted for in the price adjustment provisions where applicable, in accordance with GCC Clause 15.

32. Force Majeure

32.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

32.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

32.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

33. Change Orders and Contract Amendments

33.1 The Purchaser may at any time order the Supplier through notice in accordance GCC Clause 8, to make changes within the general scope of the Contract in any one or more of the following:

(a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;

(b) the method of shipment or packing;

(c) the place of delivery; and

(d) the Related Services to be provided by the Supplier.

33.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

33.3 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not

exceed the prevailing rates charged to other parties by the Supplier for similar services.

33.4 **Value Engineering:** The Supplier may prepare, at its own cost, a value engineering proposal at any time during the performance of the contract. The value engineering proposal shall, at a minimum, include the following;

(a) the proposed change(s), and a description of the difference to the existing contract requirements;

(b) a full cost/benefit analysis of the proposed change(s) including a description and estimate of costs (including life cycle costs) the Purchaser may incur in implementing the value engineering proposal; and

(c) a description of any effect(s) of the change on performance/functionality.

The Purchaser may accept the value engineering proposal if the proposal demonstrates benefits that:

(a) accelerates the delivery period; or

(b) reduces the Contract Price or the life cycle costs to the Purchaser; or

(c) improves the quality, efficiency or sustainability of the Goods; or

(d) yields any other benefits to the Purchaser,

without compromising the necessary functions of the Facilities.

If the value engineering proposal is approved by the Purchaser and results in:

(a) a reduction of the Contract Price; the amount to be paid to the Supplier shall be the percentage specified **in the PCC** of the reduction in the Contract Price; or

(b) an increase in the Contract Price; but results in a reduction in life cycle costs due to any benefit described in (a) to (d) above, the amount to be paid to the Supplier shall be the full increase in the Contract Price.

33.5 Subject to the above, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

34. Extensions of Time

34.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant to GCC Clause 13, the Supplier shall promptly notify

the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

34.2 Except in case of Force Majeure, as provided under GCC Clause 32, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 26, unless an extension of time is agreed upon, pursuant to GCC Sub-Clause 34.1.

35. Termination

35.1 Termination for Default

(a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

(i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 34;

(ii) if the Supplier fails to perform any other obligation under the Contract; or

(iii) if the Supplier, in the judgment of the Purchaser has engaged in Fraud and Corruption, as defined in paragraph 2.2 a of the Appendix 1 to the GCC, in competing for or in executing the Contract.

(b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 35.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

35.2 Termination for Insolvency.

(a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect

any right of action or remedy that has accrued or will accrue thereafter to the Purchaser

35.3 Termination for Convenience.

(a) The Purchaser, by notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.

(b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:

(i) to have any portion completed and delivered at the Contract terms and prices; and/or

(ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

36. Assignment

36.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.

37. Export Restriction

37.1 Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, which arise from trade regulations from a country supplying those products/goods, systems or services, and which substantially impede the Supplier from meeting its obligations under the Contract, shall release the Supplier from the obligation to provide deliveries or services, always provided, however, that the Supplier can demonstrate to the satisfaction of the Purchaser and of the Bank that it has completed all formalities in a timely manner, including applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract. Termination of the Contract on this basis shall be for the Purchaser's convenience pursuant to Sub-Clause 35.3.

APPENDIX 1

(Text in this Appendix shall not be modified)

Fraud and Corruption

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, the Bank:

a. Defines, for the purposes of this provision, the terms set forth below as follows:

i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;

iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

v. "obstructive practice" is:

(a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.

b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

d. Pursuant to the Bank's Anti-Corruption Guidelines, and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;1 (ii) to be a nominated2 sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;

e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect[3] all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

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[1] For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.

[2] A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

[3] Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

APPENDIX 2

Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH) Performance Declaration for Subcontractors*

[The following table shall be filled in by each subcontractor proposed by the Supplier, that was not named in the Contract]

Subcontractor's Name: *[insert full name]*

Date: *[insert day, month, year]*
Contract reference *[insert contract reference]*
Page *[insert page number]* of *[insert total number]* pages

SEA and/or SH Declaration
We: ☐ (a) have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations. ☐ (b) are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations. ☐ (c) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, and were removed from the disqualification list. An arbitral award on the disqualification case has been made in our favor.
[*If (c) above is applicable, attach evidence of an arbitral award reversing the findings on the issues underlying the disqualification.]*
Period of disqualification: From: _____ To: _____

Name of the Subcontractor_____

Name of the person duly authorized to sign on behalf of the Subcontractor_____

Title of the person signing on behalf of the Subcontractor_____

Signature of the person named above_____

Date signed _____ day of _____, _____

Countersignature of authorized representative of the Supplier:
Signature: _____

Date signed _____ day of _____, _____

Section IX - Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

GCC 1.1(i)	The Purchaser's Country is: Pakistan
GCC 1.1(j)	The Purchaser is: Federal Board of Revenue (FBR)
GCC 1.1 (o)	The Project Site(s)/Final Destination(s) is/are: Islamabad and Lahore
GCC 1.1 (p)	The term **SEA/SH** where used in the Contract has the following meaning: • "**Sexual Exploitation and Abuse" "(SEA)"** means the following: **Sexual Exploitation** is defined as any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. **Sexual Abuse** is defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions. • **"Sexual Harassment" "(SH)"** is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature by supplier's personnel with other supplier's, or purchaser's personnel.
GCC 4.2 (a)	The meaning of the trade terms shall be as prescribed by Incoterms: 2020 **DDP**
GCC 4.2 (b)	The version edition of Incoterms shall be Incoterms 2020
GCC 5.1	The language shall be: English
GCC 8.1	For **notices**, the Purchaser's address shall be: Attention: Director (Program Office) Street Address: FBR House, Constitution Avenue Floor/ Room number*: Room No. 574, 5th Floor* City: Islamabad ZIP Code: 44000 Country: Pakistan Telephone: 0092 51 9219649 Electronic mail address*: director.prr@fbr.gov.pk*

GCC 9.1	The governing law shall be the law of*:* Islamic Republic of Pakistan
GCC 10.2	The rules of procedure for arbitration proceedings pursuant to GCC Clause 10.2 shall be as follows: In the case of a dispute between the Purchaser and a Supplier who is a national of the Purchaser's country, the dispute shall be referred to adjudication or arbitration in accordance with Pakistan Arbitration Act 1940. ***(a) Contracts with Supplier national of the Purchaser's Country:*** In the case of a dispute between the Purchaser and a Supplier who is a national of the Purchaser's Country, the dispute shall be referred to adjudication or arbitration in accordance with the laws of the Purchaser's Country.
GCC 13.1	Details of Shipping and other Documents to be furnished by the Supplier are: Supplier's Valued Invoice(s), GST Invoice(s) (as applicable), Packing List(s), Freight Member (if any), Weight and Measurement Certificate(s), Original Bill of Landing / Airway Bill / Delivery Note / Railway Receipt / Truck Receipt (as the case may be), Certificate of Origin, Warranty Certificate, Insurance Declaration, Custom Clearance and Inspection Certificate and / or Supplier's Factory Test Certificate. The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.
GCC 14.9	Supplier shall be responsible to take all necessary measures to protect Purchaser's systems.

GCC 14.10	GCC 14.10.1 The Supplier shall have a code of conduct, and provide appropriate sensitization, for the Supplier's personnel carrying out *[state as applicable: installation/operation/maintenance/operation and maintenance]* that include, but not limited to, maintaining a safe working environment and not engaging in the following practices: (i) any form of sexual harassment including unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature with other Supplier's or Purchaser's personnel; (ii) any form of sexual exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another; (iii) any form of sexual abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions; and (iv) any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage. GCC 14.10.2 The Purchaser may require the Supplier to remove (or cause to be removed), from the site or other places where the *[state as applicable: installation/operation/maintenance/operation and maintenance]* is being executed, a Supplier's personnel that undertakes behaviors that are inconsistent with the code of conduct stated in GCC 14.9.1. Notwithstanding any requirement from the Purchaser to replace any such person, the Supplier shall immediately remove (or cause to be removed) any such person, from the site or other places where the *[state as applicable: installation/operation/ maintenance/ operation and maintenance]* is being executed. In either case, the Supplier shall promptly appoint, as appropriate, a suitable replacement with equivalent skills and experience. The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.
GCC 15.1	The prices charged for the Goods supplied and the related Services performed *shall not* be adjustable.

GCC 16.1	The payment(s) shall be made upon completion of delivery and successful installation, testing and commissioning (where/ if applicable) on DDP (Delivered Duty Paid) basis as per respective clauses of the Contract and verification/ acceptance/ sign-off of the Supplier's invoice(s) along with Documents for Payments by the Purchaser. **Payment Schedule:** A sign-off by Purchaser regarding successful delivery and subsequent installation, testing and commissioning (where/ if applicable) shall be a prerequisite before an invoice can be submitted by the Supplier. The method and conditions of payment to be made to the Supplier under this Contract shall be as follows: **A. Payment for Goods and Services in Local Currency (PKR):** Purchaser will make 100% of the individual invoice payment through Cross Cheque in PKR to the Supplier. **Payment Terms:** Ten (10) percent of the Contract Price shall be paid within thirty (30) days of signing of the Contract, and upon submission of claim and a bank guarantee for equivalent amount valid until the Goods are delivered and in the form provided in the bidding document or another form acceptable to the Purchaser. Fifty (50) percent on Data Centre execution on prorate basis Thirty (30) % Operational Acceptance Ten (10) % on quarterly basis in advance for SLA
GCC 16.5	1%+KIBOR.
GCC 18.1	A Performance Security shall be required. The amount of the Performance Security shall be: Ten (10) % of the Contract(s) Price in the shape of an unconditional and irrecoverable Bank Guarantee issued by any scheduled bank in Pakistan for the duration of the contract.
GCC 18.3	If required, the Performance Security shall be in the form of: As above.
GCC 18.4	Discharge of the Performance Security shall take place: within 30 days following successful completion of warranty and performance obligations by the Supplier under the Contract.

GCC 23.2	The packing, marking and documentation within and outside the packages shall be: ***1***. The Supplier shall provide such packing of the goods as is required to prevent damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and upon storage. Packing case size and weight shall take into consideration, where appropriate, the remoteness of the goods final destination and the absence of heavy handling facilities at all points in transit. In case of any damage to the materials due to in secure and/or improper packing, resulting on account of normal handling, the Supplier shall make good such damages free of charge to Purchaser. 2. The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract in any subsequent instructions ordered by Purchaser. Each packaging shall be clearly and legibly marked in English with the name of the Supplier, the Consignee, Contract No., date and quantity of material/ items
GCC 24.1	The insurance coverage shall be as specified in the Incoterms. If not in accordance with Incoterms, insurance shall be as follows: 1. Insurance of the goods up to designated location(s) (named place of final destination) basis is the responsibility of the Supplier. 2. The goods shall be fully insured by the Supplier against any loss or damage incidental to manufacture or acquisition, transportation, storage, delivery and subsequent installation, testing and commissioning (where/ if applicable) as specified in the Contract or for any extended period as instructed by Purchaser and price thereof is included in the Contract price
GCC 25.1	Responsibility for transportation of the Goods shall be as specified in the Incoterms.
GCC 25.2	Incidental services to be provided are: Installation, Testing and Commissioning of Goods. 05 Years Comprehensive on-site warranty inclusive in the product / item final price.
GCC 26.1	The inspections and tests shall be: Applicable.
GCC 26.2	The Inspections and tests shall be conducted at: Not Applicable.
GCC 27.1	The liquidated damage shall be: 01% per week of the delayed part
GCC 27.1	The maximum amount of liquidated damages shall be: 10% of the total contract value.

GCC 28.3	
GCC 28.5 & 28.6	The period for repair or replacement shall be: Response Time: within 02 hours Resolution Time: within 24 hours The response and resolution times: 24x7x365 during the warranty. The requirement of Response and Resolution times shall be in accordance with the provisions of the Technical Specifications and the respective clause(s) No. L.5 “Maintenance Conditions” of this Documents as mentioned under Section VIII – Schedule of Requirements.
GCC 33.4	Not Applicable.

Attachment: Price Adjustment Formula

If in accordance with GCC 15.1, prices shall be adjustable, the following method shall be used to calculate the price adjustment:

15.1 Prices payable to the Supplier, as stated in the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of labor and material components in accordance with the formula:

$$P_1 = P_0 \left[a + \frac{bL_1}{L_0} + \frac{cM_1}{M_0}\right] - P_0$$

$$a+b+c = 1$$

in which:

P_1	=	adjustment amount payable to the Supplier.
P_0	=	Contract Price (base price).
a	=	fixed element representing profits and overheads included in the Contract Price and generally in the range of five (5) to fifteen (15) percent.
b	=	estimated percentage of labor component in the Contract Price.
c	=	estimated percentage of material component in the Contract Price.
L_0, L_1	=	*labor indices applicable to the appropriate industry in the country of origin on the base date and date for adjustment, respectively.
M_0, M_1	=	*material indices for the major raw material on the base date and date for adjustment, respectively, in the country of origin.

The Bidder shall indicate the source of the indices and the base date indices in its Bid. The coefficients a, b, and c as specified by the Purchaser are as follows:

a = *[insert value of coefficient]*
b= *[insert value of coefficient]*
c= *[insert value of coefficient]*

Base date = thirty (30) days prior to the deadline for submission of the Bids.

Date of adjustment = *[insert number of weeks]* weeks prior to date of shipment (representing the mid-point of the period of manufacture).

The above price adjustment formula shall be invoked by either party subject to the following further conditions:

(a) No price adjustment shall be allowed beyond the original delivery dates. As a rule, no price adjustment shall be allowed for periods of delay for which the Supplier is entirely responsible. The Purchaser will, however, be entitled to any decrease in the prices of the Goods and Services subject to adjustment.

(b) If the currency in which the Contract Price P_0 is expressed is different from the currency of origin of the labor and material indices, a correction factor will be applied to avoid incorrect adjustments of the Contract Price. The correction factor shall be: Z_0 / Z_1, where,

Z_0 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price P_0 on the Base date, and

Z_1 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price P_0 on the Date of Adjustment.

(c) No price adjustment shall be payable on the portion of the Contract Price paid to the Supplier as advance payment.

Section X - Contract Forms

Table of Forms

Notification of Intention to Award

[*This Notification of Intention to Award shall be sent to each Bidder that submitted a Bid, unless the Bidder has previously received notice of exclusion from the process at an interim stage of the procurement process.*]

[*Send this Notification to the Bidder's Authorized Representative named in the Bidder Information Form*]

For the attention of Bidder's Authorized Representative

Name: *[insert Authorized Representative's name]*

Address: *[insert Authorized Representative's Address]*

Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]*

Email Address: *[insert Authorized Representative's email address]*

[IMPORTANT: insert the date that this Notification is transmitted to Bidders. The Notification must be sent to all Bidders simultaneously. This means on the same date and as close to the same time as possible.]

DATE OF TRANSMISSION: This Notification is sent by: [*email/fax*] on [*date*] (local time)

Notification of Intention to Award

Purchaser: *[insert the name of the Purchaser]*
Project: *[insert name of project]*
Contract title: *[insert the name of the contract]*
Country: *[insert country where RFB is issued]*
Loan No. /Credit No. / Grant No.: *[insert reference number for loan/credit/grant]*
RFB No: *[insert RFB reference number from Procurement Plan]*

This Notification of Intention to Award (Notification) notifies you of our decision to award the above contract. The transmission of this Notification begins the Standstill Period. During the Standstill Period you may:

a) request a debriefing in relation to the evaluation of your Bid, and/or

b) submit a Procurement-related Complaint in relation to the decision to award the contract.

1. The successful Bidder

Name:	[*insert name of successful Bidder*]
Address:	[*insert address of the successful Bidder*]
Contract price:	[*insert contract price of the successful Bid*]

Total combined score:	*[insert the total combined score of the successful Bidder]*

2. Other Bidders *[INSTRUCTIONS: insert names of all Bidders that submitted a Bid, Bid prices as read out and evaluated, technical scores and combined scores.]*

Name of Bidder	Technical Score	Bid Price	Evaluated Bid Cost	Combined Score
[*insert name*]	*[insert Technical score]*	[*insert Bid price*]	*[insert evaluated cost]*	*[insert combined score]*
[*insert name*]	*[insert Technical score]*	[*insert Bid price*]	*[insert evaluated cost]*	*[insert combined score]*
[*insert name*]	*[insert Technical score]*	[*insert Bid price*]	*[insert evaluated cost]*	*[insert combined score]*
[*insert name*]	*[insert Technical score]*	[*insert Bid price*]	*[insert evaluated cost]*	*[insert combined score]*
[*insert name*]	*[insert Technical score]*	[*insert Bid price*]	*[insert evaluated cost]*	*[insert combined score]*

3. Reason/s why your Bid was unsuccessful *[Delete if the combined score already reveals the reason]*

[INSTRUCTIONS: State the reason/s why <u>this</u> Bidder's Bid was unsuccessful. Do NOT include: (a) a point by point comparison with another Bidder's Bid or (b) information that is marked confidential by the Bidder in its Bid.]

4. How to request a debriefing

DEADLINE: The deadline to request a debriefing expires at midnight on [*insert date*] (local time).

You may request a debriefing in relation to the results of the evaluation of your Bid. If you decide to request a debriefing your written request must be made within three (3) Business Days of receipt of this Notification of Intention to Award.

Provide the contract name, reference number, name of the Bidder, contact details; and address the request for debriefing as follows:

Attention: [*insert full name of person, if applicable*]

Title/position: [*insert title/position*]

Agency: [*insert name of Purchaser*]

Email address: [*insert email address*]

Fax number: [*insert fax number*] ***delete if not used***

If your request for a debriefing is received within the 3 Business Days deadline, we will provide the debriefing within five (5) Business Days of receipt of your request. If we are unable to provide the debriefing within this period, the Standstill Period shall be extended by five (5) Business Days after the date that the debriefing is provided. If this happens, we will notify you and confirm the date that the extended Standstill Period will end.

The debriefing may be in writing, by phone, video conference call or in person. We shall promptly advise you in writing how the debriefing will take place and confirm the date and time.

If the deadline to request a debriefing has expired, you may still request a debriefing. In this case, we will provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of the Contract Award Notice.

5. How to make a complaint

Period: Procurement-related Complaint challenging the decision to award shall be submitted by midnight, [*insert date*] (local time).

Provide the contract name, reference number, name of the Bidder, contact details; and address the Procurement-related Complaint as follows:

Attention: [*insert full name of person, if applicable*]

Title/position: [*insert title/position*]

Agency: [*insert name of Purchaser*]

Email address: [*insert email address*]

Fax number: [*insert fax number*] ***delete if not used***

At this point in the procurement process, you may submit a Procurement-related Complaint challenging the decision to award the contract. You do not need to have requested, or received, a debriefing before making this complaint. Your complaint must be submitted within the Standstill Period and received by us before the Standstill Period ends.

Further information:

For more information see the Procurement Regulations for IPF Borrowers (Procurement Regulations) (Annex III). You should read these provisions before preparing and submitting your complaint. In addition, the World Bank's Guidance "How to make a Procurement-related Complaint" provides a useful explanation of the process, as well as a sample letter of complaint.

In summary, there are four essential requirements:

1. You must be an 'interested party'. In this case, that means a Bidder who submitted a Bid in this bidding process, and is the recipient of a Notification of Intention to Award.
2. The complaint can only challenge the decision to award the contract.
3. You must submit the complaint within the period stated above.
4. You must include, in your complaint, all of the information required by the Procurement Regulations (as described in Annex III).

6. Standstill Period

DEADLINE: The Standstill Period is due to end at midnight on [*insert date*] (local time).

The Standstill Period lasts ten (10) Business Days after the date of transmission of this Notification of Intention to Award.

The Standstill Period may be extended as stated in Section 4 above.

If you have any questions regarding this Notification please do not hesitate to contact us.

On behalf of the Purchaser:

Signature: _____

Name: _____

Title/position: _____

Telephone: _____

Email: _____

Beneficial Ownership Disclosure Form

INSTRUCTIONS TO BIDDERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE FORM

This Beneficial Ownership Disclosure Form ("Form") is to be completed by the successful Bidder[1]. In case of joint venture, the Bidder must submit a separate Form for each member. The beneficial ownership information to be submitted in this Form shall be current as of the date of its submission.

For the purposes of this Form, a Beneficial Owner of a Bidder is any natural person who ultimately owns or controls the Bidder by meeting one or more of the following conditions:

- *directly or indirectly holding 25% or more of the shares*
- *directly or indirectly holding 25% or more of the voting rights*
- *directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder*

RFB No.: [*insert number of RFB process*]
Request for Bid No.: [*insert identification*]

To: **[*insert complete name of Purchaser*]**

In response to your request in the Letter of Acceptance *dated [insert date of letter of Acceptance]* to furnish additional information on beneficial ownership: *[select one option as applicable and delete the options that are not applicable]*

(i) we hereby provide the following beneficial ownership information.

Details of beneficial ownership

Identity of Beneficial Owner	Directly or indirectly holding 25% or more of the shares (Yes / No)	Directly or indirectly holding 25 % or more of the Voting Rights (Yes / No)	Directly or indirectly having the right to appoint a majority of the board of the directors or an equivalent governing body of the Bidder (Yes / No)
[include full name (last, middle, first), nationality, country of residence]			

OR

(ii) *We declare that there is no Beneficial Owner meeting one or more of the following conditions:*

- directly or indirectly holding 25% or more of the shares
- directly or indirectly holding 25% or more of the voting rights
- directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder

OR

(iii) We declare that we are unable to identify any Beneficial Owner meeting one or more of the following conditions. [If this option is selected, the Bidder shall provide explanation on why it is unable to identify any Beneficial Owner]

- directly or indirectly holding 25% or more of the shares
- directly or indirectly holding 25% or more of the voting rights
- directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder]"

Name of the Bidder: *[*insert complete name of the Bidder*]_____

Name of the person duly authorized to sign the Bid on behalf of the Bidder: **[*insert complete name of person duly authorized to sign the Bid*]_____

Title of the person signing the Bid: [*insert complete title of the person signing the Bid*]_____

Signature of the person named above: [*insert signature of person whose name and capacity are shown above*]_____

Date signed [*insert date of signing*] **day of** [*insert month*], [*insert year*]_____

* In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder. In the event that the Bidder is a joint venture, each reference to "Bidder" in the Beneficial Ownership Disclosure Form (including this Introduction thereto) shall be read to refer to the joint venture member.

** Person signing the Bid shall have the power of attorney given by the Bidder. The power of attorney shall be attached with the Bid Schedules.

Letter of Acceptance

[letterhead paper of the Purchaser]

[date]

To: *[name and address of the Supplier]*

Subject: ***Notification of award Contract No.*** . . . . . .

This is to notify you that your Bid dated . . . . ***[insert date] . . .*** . for execution of the . . . . . **. . . .** ***[insert name of the contract and identification number, as given in the SCC]*** . . . . . for the Accepted Contract Amount of . . . . . **. . .** ***[insert amount in numbers and words and name of currency]***, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish (i) the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms and (ii) the additional information on beneficial ownership in accordance with ITB 48.1 within eight (8) Business days using the Beneficial Ownership Disclosure Form, included in Section X, - Contract Forms, of the Bidding Document.

Authorized Signature: _____

Name and Title of Signatory: _____

Name of Agency: _____

Attachment: Contract Agreement

Contract Agreement

[The successful Bidder shall fill in this form in accordance with the instructions indicated]

THIS AGREEMENT made the *[insert: **number**]* day of *[insert: **month**], [insert: **year**]*.

BETWEEN

(1) *[insert complete name of Purchaser]*, a *[insert description of type of legal entity, for example, an agency of the Ministry of .... of the Government of { insert name of Country of Purchaser }, or corporation incorporated under the laws of { insert name of Country of Purchaser }]* and having its principal place of business at *[insert address of Purchaser]* (hereinafter called "the Purchaser"), of the one part, and

(2) *[insert name of Supplier]*, a corporation incorporated under the laws of *[insert: country of Supplier]* and having its principal place of business at *[insert: address of Supplier]* (hereinafter called "the Supplier"), of the other part:

WHEREAS the Purchaser invited Bids for certain Goods and ancillary services, viz., *[insert brief description of Goods and Services]* and has accepted a Bid by the Supplier for the supply of those Goods and Services

The Purchaser and the Supplier agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other contract documents.

   (a) the Letter of Acceptance

   (b) Letter of Bid - Technical Part

   (c) Letter of Bid - Financial Part

   (d) the Addenda Nos._____ (if any)

   (e) Special Conditions of Contract

   (f) General Conditions of Contract

   (g) the Specification (including Schedule of Requirements and Technical Specifications)

   (h) the completed Schedules (including Price Schedules)

   (i) any other document listed in GCC as forming part of the Contract

3. In consideration of the payments to be made by the Purchaser to the Supplier as specified in this Agreement, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, 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 Agreement to be executed in accordance with the laws of *[insert the name of the Contract governing law country]* on the day, month and year indicated above.

For and on behalf of the Purchaser:

Signed: *[insert signature]*

in the capacity of *[insert title or other appropriate designation]*

in the presence of *[insert identification of official witness]*

For and on behalf of the Supplier:

Signed: *[insert signature of authorized representative(s) of the Supplier]*

in the capacity of *[insert title or other appropriate designation]*

in the presence of *[insert identification of official witness]*

Performance Security

Option 1: (Bank Guarantee)

[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of Purchaser]*

Date: *[Insert date of issue]*

PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _ *[insert name of Supplier, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the supply of _ *[insert name of contract and brief description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (_____) *[insert amount in words]*,[1] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the …. Day of ……, 2…[2], and any demand for payment under it must be received by us at this office indicated above on or before that date.

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[1] *The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, and denominated either in the currency (ies) of the Contract or a freely convertible currency acceptable to the Beneficiary.*

[2] *Insert the date twenty-eight days after the expected completion date as described in GC Clause 18.4. The Purchaser should note that in the event of an extension of this date for completion of the Contract, the Purchaser would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this*

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

_____

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

guarantee, the Purchaser might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

Advance Payment Security

Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of Purchaser]*

Date: *[Insert date of issue]*

ADVANCE PAYMENT GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Supplier, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* () *[insert amount in words]* is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (_____) *[insert amount in words]*[1] upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

(a) has used the advance payment for purposes other than toward delivery of Goods; or

(b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

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[1] *The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Purchaser.*

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, has been certified for payment, or on the *[insert day]* day of *[insert month]*, 2 *[insert year]*, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No.758, except that the supporting statement under Article 15(a) is hereby excluded.

_____

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.