Standard Bidding Document

Installation of HVAC WORKS at Academic Block of SZABMU (Works)

National

Single Stage-Two Envelope

November 04, 2026

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REQUEST FOR BIDS

PROCUREMENT OF CIVIL WORKS

1. The **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad)** has reserved Funds for the procurement planned for FY **2026-27**. The **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad)** intends to apply part of the proceeds of this Fund to cover eligible payments under the contract for the " **Installation of HVAC WORKS at Academic Block of SZABMU**" with the reference of **"P168510"**

2. The **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad)** invites electronic Bids from eligible Bidders for procurement of Works **(Installation of HVAC WORKS at Academic Block of SZABMU)** described in the bidding documents on **EPADS v2.0**.

3. **Single Stage-Two Envelope** will be used by adopting **Least Cost Based Selection (LCBS)** Technique for the subject procurement, in line with the Public Procurement Rules, 2004 and any Regulations, Regulatory Guides, Procurement Guidelines or Instructions issued by the Authority from time to time.

4. All Bids must be accompanied by a Bid Security amounting described in Bid Security Section in Bidding Document in the form of **Pay Order, Bank Guarantee, Demand Draft**. Or all bids must be accompanied by bid securing declaration in the format specified in the Bidding documents

5. E-Bidding documents, containing detailed terms & conditions, specifications and requirements etc. are available on **e-Pak Acquisition and Disposal System (EPADS)** at **https://epads.gov.pk/opportunities/federal/procurements/168510** for all the interested bidders registered on **EPADS v2.0**. Bidders are required to get themselves registered on **EPADS v2.0** to participate in Bidding process.

6. The e-bids, prepared in accordance with the instructions in the e-Bidding documents, must be submitted through **EPADS v2.0** on or before **Tuesday, November 17, 2026 11:00 AM**. E-bids will be opened by using **EPADS v2.0** on the same day at **Tuesday, November 17, 2026 11:30 AM**. Manual submission of Bids shall not be entertained. Those vendor who have not yet registered on the new version of **EPADS v2.0**, may register themselves on **https://vendors.epads.gov.pk/**. A tutorial to explain the registration process is available at **https://www.youtube.com/watch?v=MNW6T38v7tc.**

In terms of Rules 48 of Public Procurement Rules, 2004 Grievance Redressal Committee (GRC) is notified for the subject procurement and notification copy is available on the procuring agency's website and on Authority's website at (**www.ppra.gov.pk**).

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Instructions to Bidders

A. INTRODUCTION

1. **Scope of Bid**

1.1. The Procuring agency/Employer (PA), as indicated in the **Bid Data Sheet** (BDS) invites Bids for the execution of Works as specified in the BDS and **Section V- Works Requirements**. The name, identification, and number of lots (contracts) of this National/ International Competitive Bidding process are specified in the BDS.

2. **Source of Funds**

2.1. Source of funds as referred in Clause 2 of Bid Data Sheet.

3. **Eligible Bidders**

3.1. A bidder may be natural person, company or firm or public or semi-public agency of Pakistan or any foreign country, or any combination of them with a formal existing agreement (on Judicial Papers) in the form of a joint venture or consortium. In the case of a joint venture or consortium, all members shall be jointly and severally liable for the execution of the Contract in accordance with the terms and conditions of the Contract. The joint venture or consortium shall nominate a Lead Member as nominated in the BDS, who shall have the authority to conduct all business for and on behalf of any and all the members of the joint venture or consortium during the Bidding process, and in case of award of contract, during the execution of contract. Verifiable copy of the agreement that forms a joint venture, consortium or association shall be required to be submitted as part of the Bid.

Any bid submitted by the joint venture, consortium or association shall indicate the part of proposed contract to be performed by each party and each party shall be evaluated (or post qualified if required) with respect to its contribution only, and the responsibilities of each party shall not be substantially altered without prior written approval of the Procuring Agency and in line with any instructions issued by the Authority.

(The limit on the number of members of JV or Consortium may be prescribed

in BDS, in accordance with the guidelines issued by the KPPRA).

3.2. The invitation for bids is open to all prospective bidders subject to any provisions of incorporation or licensing by the respective national/ international incorporating agency or statutory body established for that particular trade or business. Procuring agencies shall specify the registration/licensing requirements for the foreign bidder keeping in view the requirement of that business.

3.3. A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidders may be considered to have a conflict of interest with one or more parties in this Bidding process, if they:

3.3.1. are associated or have been associated in the past, directly or indirectly with a firm or any of its affiliates which have been engaged by the Procuring agency/Employer to provide consulting services for the preparation of design or technical specifications of the works that are the subject of the bid; or

3.3.2. have controlling shareholders in common; or

3.3.3. receive or have received any direct or indirect subsidy from any of them; or

3.3.4. have the same legal representative for purposes of this Bid; or

3.3.5. have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another bidder, or influence the decisions of the Procuring agency/Employer regarding this Bidding process; or

3.3.6. Submit more than one bid in this bidding process.

3.4. A Bidder may be ineligible if –

3.4.1. he is declared bankrupt or, in the case of company or firm, insolvent;

3.4.2. payments in favor of the bidder is suspended in accordance with the judgment of a court of law other than a judgment declaring bankruptcy and resulting (in accordance with the national laws) in the total or partial loss of the right to administer and dispose of its property;

3.4.3. the bidder is convicted, by a final judgment of a Court of Law or relevant Professional Statuary Body, of any offence involving professional conduct;

3.4.4. The bidder is debarred/ blacklisted by a national level Procuring agency/Employer and hence debarred due to involvement in corrupt and fraudulent practices, or performance failure or due to breach of bid securing declaration.

3.5. As and when required, bidders shall provide to the Procuring agency/Employer evidence of their eligibility, proof of compliance with the necessary legal requirements to carry out the contract effectively.

3.6. Bidders shall submit proposal relating to the nature, conditions and modalities of sub-contracting wherever the sub-contracting of any elements of the contract is envisaged.

4. **Eligible Material and Equipment**

4.1. All the material and equipment to be mobilized under the contract shall have their origin in eligible source countries, and all expenditures made under the contract will be limited to such materials and equipment. For this purpose, ineligible countries are stated in the section-IV titled as “Eligible Countries”.

B. BIDDING DOCUMENTS

5. **Contents of Bidding Documents**

5.1. The scope of Works, bidding procedures, and terms and conditions of the contract are prescribed in the bidding documents. In addition to the Invitation for Bids, the bidding documents which should be read in

conjunction with any addenda issued in accordance with ITB 7.1 include:

i. Section I -Invitation for Bids

ii. Section II Instructions to Bidders (ITBs)

iii. Section III Bid Data Sheet (BDS)

iv. Section IV Eligible Countries

v. Section V Evaluation and Qualification Criteria

vi. Section VI Works Requirements Technical Specifications & Schedule of Requirements

vii. Section VII Standard Bidding Forms

viii. Section VIII General Conditions of Contract (GCC)

ix. Section IX Particular Conditions of Contract (PCC)

x. Section X Contract Forms

5.2. The bidder is expected to examine all instructions, forms, specifications, terms and conditions prescribed in the bidding documents. Failure to furnish all the information required in the bidding documents will be at the bidder's risk and may result in the rejection of his bid.

6. **Clarification of Bidding Document, Pre-bid Meeting**

6.1. A prospective bidder requiring any clarification of the bidding document may notify the Procuring agency/Employer through **EPADS v2.0**.

6.2. The Procuring agency/Employer shall respond to the request for clarification in accordance with the Public Procurement Rules 2004, Rule No.31 i.e. **Clarification of bids**.

6.3. Should the Procuring Agency deem it necessary to amend the BIDDING document as a result of a clarification, it shall do so following the procedure under **ITB 7**.

6.4. If indicated in the **BDS**, the bidder's designated representative is invited at the bidder's cost to attend a pre-bid meeting at the place, date and time mentioned in the BDS. During this pre-bid meeting, prospective bidders may request clarification of the schedule of requirement, the evaluation criteria or any other aspects of the bidding documents.

6.5. Minutes of the pre-bid meeting, if applicable, including the text of the questions asked by bidders, including those during the meeting (without identifying the source) and the responses given, together with any responses prepared after the meeting will be uploaded on **EPADS v2.0**. Any modification to the bidding documents that may become necessary as a result of the pre-bid meeting shall be made by the Procuring agency/Employer exclusively through the use of an Addendum pursuant to **ITB 7**. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

6.6. The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the bidder's own expense.

6.7. The bidder and any of its authorized personnel will be granted permission by the Procuring agency/Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the bidder and its personnel will release and indemnify the Procuring agency/Employer from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

7. **Amendment of Bidding Documents**

7.1. The procuring agency may issue notification of any change, addition, modification or deletion in accordance with the KPP Rules 2014 i.e. **Bidding Documents**.

7.2. To give prospective bidders reasonable time in which to take an addendum/corrigendum into account in preparing their bids, the Procuring

agency/Employer may, at its discretion, extend the deadline for the submission of bids:

Provided that the Procuring agency/Employer shall extend the deadline for submission of bid in pursuance of KPP Rules 2014, i.e. ***Extension of time for submission of bids****, if such an addendum is issued within last three (03) days of the bid submission deadline.*

C. PREPARATION OF BIDS

8. Language of Bid

8.1. The bid prepared by the bidder, as well as all correspondence and documents relating to the bid exchanged by the bidder and the Procuring agency/Employer shall be written in the English language unless specified in the **BDS**. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant pages in the English language unless specified in the **BDS**, in which case, for purposes of interpretation of the bidder, the translation shall govern.

9. **Documents Constituting the Bids**

9.1. The Bids prepared by the Bidder shall constitute of all the documents required in the **BDS**.

10. **Documents Establishing Eligibility of Material, Equipment and Works, their Conformity to Bidding Documents**

10.1. The bid prepared by the bidder shall constitute the following components: -

10.1.1. Documentary evidence established in accordance with **ITB 10** that the material and equipment to be utilized by the Bidder for the executions of works are eligible material and equipment and conform to the Bidding Documents;

10.1.2. Documentary evidence established in accordance with **ITB 11** that the bidder has been authorized to carry out the Construction works;

10.1.3. Documentary evidence established in accordance with **ITB 11** that the bidder is eligible and/or qualified for the subject bidding process;

10.1.4. Form of Bid and Bid Prices completed in accordance with **ITB 12** and **13**;

10.1.5. Completed schedules as required, including priced Bill of Quantities in accordance with **ITB 13**.

10.1.6. Technical Proposal completed in all aspects in accordance with **ITB-15**.

10.1.7. Bid security or Bid Securing Declaration furnished in accordance with **ITB 17**;

10.1.8. Any other document required in the **BDS**.

10.2. In addition to the requirements, 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.

10.3. The bidder shall furnish, as part of its bid, all those documents establishing the eligibility in conformity to the terms and conditions specified in the bidding documents for all material, equipment and works which the bidder proposes to execute.

10.4. The documentary evidence of conformity of the material, equipment and works to the Bidding Documents may be in the form of literature, drawings, and data, and shall consist of:

10.4.1. a detailed description of the work methodology, approach, schedule and resources to be mobilized at site;

10.4.2. an item-by-item commentary on the Procuring agency/Employer's Technical Specifications demonstrating substantial responsiveness of the material, equipment and works to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications;

10.4.3. any other procurement specific documentation requirement as stated in the **BDS**.

10.5. The required documents and other accompanying documents must be in English. In case any other language than English is used the pertinent translation into English shall be attached to the original version.

11. **Documents Establishing Eligibility and Qualification of the Bidder**

11.1. The bidder shall furnish, as part of its bid, all those documents establishing the bidder's eligibility to participate in the bidding process and/or its qualification to perform the contract if its bid is accepted.

11.2. The documentary evidence of the bidder's eligibility to bid shall establish to the satisfaction of the Procuring agency/Employer that the bidder, at the time of submission of its bid, is from an eligible country as defined in Section-IV titled as "Eligible Countries".

11.3. The documentary evidence of the bidder's qualification to perform the contract if its bid is accepted shall establish to the satisfaction of Procuring agency/Employer that:

11.3.1. The bidder has the financial and technical capability necessary to perform the Contract, meets the qualification criteria specified in Section-V, Evaluation and Qualification Criteria and **BDS**.

11.3.2. In the case of a bidder not doing business within Pakistan, the bidder is or will be (if awarded the contract) represented by a local bidder (Joint Venture) in accordance with the PEC works bylaws, and in case of award of works such foreign firm is required to participate in the execution of works to carry out its obligations as prescribed in the Conditions of Contract and /or Technical Specifications.

11.3.3. That the bidder meets the qualification criteria listed in Section-V, Evaluation and Qualification Criteria and **BDS**.

12. **Forms of Bid**

12.1. The Bidder shall fill the Form of Bids furnished in the bidding documents. The Bids Form must be completed without any alterations to its format and no substitute shall be accepted.

13. **Bid Prices**

13.1. The bid prices quoted by the bidder in the Standard bid Forms, Bill of Quantities and in the Price Schedules shall conform to the requirements specified below or exclusively mentioned hereafter in the bidding documents.

13.2. The bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. If a Price Schedule shows items listed but not priced, their prices shall be construed to be included in the prices of other items in the Bill of Quantities and will not be paid for separately by the Procuring agency/Employer.

13.3. Items not listed in the Price Schedule shall be assumed not to be included in the bid, and provided that the bid is still substantially responsive in their absence or due to their nominal nature, the corresponding average price of the respective item(s) of the remaining substantially responsive bidder(s) shall be construed to be the price of those missing item(s):
Provided that:

13.3.1. where there is only one (substantially) responsive bidder, or

13.3.2. where there is provision for alternate proposals and the respective items are not listed in the other bids,

The Procuring agency/Employer may fix the price of missing items in accordance with market survey, and the same shall be considered as final price.

13.4. The Bid price to be quoted in the Form of Bid in accordance with ITB 12 shall be the total price of the bid.

13.5. Unless otherwise specified in the **BDS** and the Contract, the rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract.

13.6. If so specified in ITB 1.1, bids may be invited for individual lots (contracts) or for any combination of lots (packages).

13.7. Prices quoted by the Bidder shall be fixed during the bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and shall be rejected, pursuant to **ITB 27**, unless otherwise price adjustment is permissible under Conditions of the Contract.

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

14. **Currencies of Bid and Payment**

14.1. Prices shall be quoted in Pakistani Rupees unless otherwise specified in the **BDS**. Comparison of bids and tie of bid shall be treated in accordance with the KPP rules 2014.

15. **Documents Comprising the Technical Proposal**

15.1. The bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section VII – Standard Bid Forms, in sufficient detail to demonstrate the adequacy of the bidder's proposal to meet the work requirements and the completion time.

16. **Bid Validity Period**

16.1. Bids shall remain valid for the period specified in the BDS after the bid submission deadline prescribed by the Procuring agency/Employer. A bid valid for a shorter period shall be rejected by the Procuring agency/Employer as non-responsive. The period of bid validity will be determined from the complementary bid securing instrument i.e. the expiry period of bid security or bid securing declaration as the case may be.

16.2. Under exceptional circumstances, prior to the expiration of the initial Bids/Bid validity period, the Procuring Agency may request the Bidders' consent to an extension of the period of validity of their Bids/Bid. Such request for extension of the period of bid validity shall be carried out in accordance with the KPP rules 2014, i.e. Bid Validity.

17. **Bid Security or Bid Securing Declaration**

17.1. Pursuant to ITB 11.1 unless otherwise specified in the BDS, the bidder shall furnish as part of its bid, a Bid Security in accordance with the KPP Rules 2014, in the amount and currency specified in the BDS or Bid Securing Declaration as specified in the BDS in the format provided in Section VII (Standard Bidding Forms).

In case Procuring agency/Employer is inviting bids in lots / packages, the bidder shall be required to submit his bid security against the respective lot/ package for which he is submitting his bid.

Until the development of functionality of auto verification of financial instrument in **EPADS v2.0**, the scanned copy of bid security or bid securing declaration, as the case may be, shall be uploaded on **EPADS v2.0** whereas the original instrument to be submitted to the procuring agency before closing of bid submission deadline,

17.2. The Bid Security shall be denominated in the local currency or in another freely convertible currency, and it shall be in the form specified in the BDS which shall be in any of the following:

17.2.1. A bank guarantee, an irrevocable letter of credit issued by a Scheduled bank in the form provided in the Bidding Documents or another form acceptable to the Procuring agency/Employer and valid for twenty-

eight (28) days beyond the end of the validity of the Bid. This shall also apply if the period for Bid Validity is extended. In either case, the form must include the complete name of the bidder;

17.2.2. A cashier's or certified cheque; or

17.2.3. Another security as indicated in the **BDS**.

17.3. The Bid Security or Bid Securing Declaration shall be in accordance with the Form of the Bid Security or Bid Securing Declaration included in Section VII (Standard Bidding Forms) or another form approved by the Procuring agency/Employer prior to the bid submission.

17.4. The Bid Security shall be payable promptly upon written demand by the Procuring agency/Employer in case any of the conditions listed in **ITB 17.9** are invoked.

17.5. Any bid not accompanied by a Bid Security or Bid Securing Declaration in accordance with **ITB 17.1 or 17.3** shall be rejected by the Procuring agency/Employer and shall be declared as non-responsive bid, pursuant to **ITB 27**.

17.6. Unsuccessful bidders' Bid Security will be discharged or returned as promptly as possible, however in no case later than thirty (30) days after the expiration of the period of Bid Validity prescribed by the Procuring agency/Employer pursuant to **ITB 16**. The Procuring agency/Employer shall make no claim to the amount of the Bid Security, and shall promptly return the Bid Security document, after whichever of the following that occurs earliest:

17.6.1. The expiry of the Bid Security;

17.6.2. The entry into force of a procurement contract and the provision of a performance security (or guarantee), for the performance of the contract if such a security (or guarantee), is required by the Biding documents;

17.6.3. The rejection by the Procuring agency/Employer of all Bids;

17.6.4. The withdrawal of the bid prior to the deadline for the submission of bids, unless the biding documents stipulate that no such withdrawal is permitted.

17.7. The successful bidder's Bid Security will be discharged upon the bidder signing the contract pursuant to **ITB 40**, or furnishing the performance security (or guarantee), pursuant to **ITB 41**.

17.8. The Bid Security may be forfeited or the Bid Securing Declaration executed:
if a Bidder:

17.8.1. Withdraws its Bid during the period of Bid Validity as specified by the Procuring agency/Employer, and referred by the bidder on the Form of Bid except as provided for in ITB 16.2; or

17.8.2. In the case of a successful bidder, if the bidder fails:

17.8.2.1. to sign the contract in accordance with ITB 40; or

17.8.2.2. to furnish performance security (or guarantee) in accordance with ITB 41.

17.9. In case of Bid Security issued by the foreign bank is allowed by the Procuring agency/Employer, the same should be counter guaranteed by a corresponding bank in Pakistan. Furthermore, in case of joint venture, it should be in the name of Joint venture to ensure joint responsibility. In case the JV is not legally constituted at the time of bid submission, the bid security or bid securing declaration shall be in the names of all future members as named in the letter of bid.

18. **Withdrawal of Bids**

18.1. Before bid submission deadline, any 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 the corresponding must accompany the respective written notice.

19. **Format and Signing of Bid**

19.1. The Bidder shall prepare and submit Bids through EPADS with due diligence after carefully reading all the terms and condition before bid submission deadline.

D. SUBMISSION OF BIDS

20. **Submission of Bids**

20.1. All bids shall be submitted through **EPADS v2.0**.

21. **Deadline for Submission of Bids**

21.1. All bids shall be received through **EPADS v2.0** not later than bid submission deadline as specified in the **BDS**.

21.2. The Procuring agency/Employer may, under exceptional circumstances and at its discretion, extend the deadline for the submission of bids, pursuant to KPP Rules 2014, Extension of Time for submission of bid, by amending the Bidding Documents in accordance with ITB 7, in which case all rights and obligations of the Procuring agency/Employer and bidders previously subject to the deadline will thereafter be subject to the new deadline.

22. **Substitution and Modification of bids**

22.1. A bidder may substitute or modify his bid after it has been submitted, provided that written notice of the substitution or modification of the bid, is received by the Procuring agency/Employer prior to the deadline for submission of bids.

22.2. Revised bid may be submitted after the substitution or modification made in the original bid in accordance with the provisions referred in ITB 18.

E. OPENING AND EVALUATION OF BIDS

23. **Opening of Bids**

23.1. The Procuring Agency will open bids in accordance with the KPP rules 2014, as specified in the **BDS**.

24. **Confidentiality**

24.1. Information relating to the examination, clarification, evaluation and comparison of bids and recommendation of contract award shall not be disclosed to bidders or any other persons not officially concerned with such process until the time of the announcement of the respective evaluation report.

25. **Clarification of Bids**

25.1. Clarification of Bidding Documents shall be carried out in accordance with the KPP Rules 2014, i.e. Clarifications.

25.2. The alteration or modification in the bid which in any case affect the following parameters will be considered as a change in the substance of a bid:

25.2.1. evaluation & qualification criteria;

25.2.2. required scope of work;

25.2.3. contract price;

25.2.4. all securities requirements;

25.2.5. tax requirements;

25.2.6. terms and conditions of bidding documents.

25.2.7. change in the ranking of the bidder

26. **Preliminary Examination of Bids**

26.1. Prior to the detailed evaluation of bids, the Procuring agency/Employer will determine whether each bid:

26.1.1. meets the eligibility criteria defined in ITB 3 and ITB 4;

26.1.2. has been prepared as per the format and contents defined by the Procuring agency/Employer in the bidding documents;

26.1.3. has been properly signed;

26.1.4. is accompanied by the required securities; and

26.1.5. is substantially responsive to the requirements of the bidding documents.

The Procuring agency/Employer's determination of a bid's substantial responsiveness will be based on the contents of the bid itself.

26.2. A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one that: -

26.2.1. affects in any substantial way the scope, quality, or performance of the Works;

26.2.2. limits in any substantial way, inconsistent with the bidding documents, the Procuring agency/Employer's rights or the bidders' obligations under the Contract; or

26.2.3. if rectified, would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

26.3. The Procuring agency/Employer will confirm that the documents and information specified under ITB 9, 10 and 11 have been provided in the bid. If any of these documents or information is missing, or is not provided in accordance with the Instructions to Bidders, the bid shall be rejected.

26.4. The Procuring agency/Employer may waive-off any minor informality, nonconformity, or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder.

Explanation: A minor informality, non-conformity or irregularity is one that is merely a matter of form and not of substance. It also pertains to some

immaterial defect in a Bid or variation of a bid from the exact requirements of the invitation that can be corrected or waived without being prejudicial to other bidders. The defect or variation is immaterial when the effect on quantity, quality, or delivery is negligible when contrasted with the total cost or scope of the works. The Procuring agency/Employer either shall give the bidder an opportunity to cure any deficiency resulting from a minor informality or irregularity in a bid or waive the deficiency, whichever is advantageous to the Procuring agency/Employer. Examples of minor informalities or irregularities include failure of a bidder to –

26.4.1. Submit the number of copies of signed bids required by the invitation;

26.4.2. Furnish required information concerning the number of its employees;

26.4.3. the firm submitting a bid has formally adopted or authorized, before the date set for opening of bids, the execution of documents by typewritten, printed, or stamped signature and submits evidence of such authorization and the bid carries such a signature.

26.5. Provided that a Technical Bid is substantially responsive, the Procuring agency/Employer may request the bidder to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any such aspect of the technical Proposal linked with the ranking of the bidders. Failure of the bidder to comply with the request may result in the rejection of its bid.

26.6. Provided that a Technical Bid is substantially responsive, the Procuring agency/Employer shall rectify quantifiable nonmaterial nonconformities or omissions related to the Financial Proposal. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of the missing or nonconforming item or component.

26.7. If a bid is not substantially responsive, it will be rejected by the Procuring agency/Employer and may not subsequently be evaluated for

complete technical responsiveness.

27. **Examination of Terms and Conditions; Technical Evaluation**

27.1. The Procuring agency/Employer shall examine the bid to confirm that all terms and conditions specified in the GCC and the PCC have been accepted by the bidder without any material deviation or reservation.
For this purpose:
"**Deviation**" means departure from the requirements specified in the Bidding Document.
"**Reservation**" means setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document.

27.2. The Procuring agency/Employer shall evaluate the technical aspects of the bid submitted in accordance with ITB 30, to confirm that all requirements specified in Section VI – Works Requirement, Technical Specifications of the Bidding Documents have been met without material deviation or reservation.

27.3. If after the examination of the terms and conditions and the technical evaluation, the Procuring agency/Employer determines that the bid is not substantially responsive in accordance with ITB 27, it shall reject the bid.

28. **Correction of Arithmetic Errors**

28.1. Bids determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows: -

28.1.1. if there is a discrepancy between unit prices and the sub-total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the sub-total price shall be corrected, unless in the opinion of the Procuring agency/Employer there is an obvious misplacement of the decimal point in the unit price, in which the total price as quoted shall govern and the unit price shall be corrected;

28.1.2. if there is an error in a total corresponding to the addition or subtraction of sub-totals, the sub-totals shall prevail, and the total shall be corrected; and

28.1.3. where there is a discrepancy between the amounts in figures and in words, the amount in words will govern.

28.1.4. Where there is discrepancy between grand total of price schedule and amount mentioned on the Form of Bid, the amount referred in Price Schedule shall be treated as correct subject to elimination of other errors.

28.2. The amount stated in the Bid will, be rectified by the Procuring agency/Employer in accordance with the above procedure for the correction of errors and, with, the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount, its bid shall be rejected after forfeiture of Bid Security or execution of the Bid Securing Declaration, as the case may be, in accordance with ITB 41.3.

29. **Conversion to Single Currency**

29.1. The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works from outside the Procuring agency/Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in the letter of bid-financial proposal. The proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in the currency of the Bidder's home country or, (ii) at the bidder's option, entirely in Pak rupees provided always that a bidder expecting to incur expenditures in a currency or currencies other than those stated in (i) and (ii) above for a portion of the foreign currency requirements, and wishing to be paid accordingly, shall indicate the respective portions in his bid. Comparison of bids quoted in different currencies and conversion of bids into a single currency shall be carried out in accordance with the PP Rule 2004, rule no. 30 (2).

30. **Evaluation of Bids**

30.1. The Procuring agency/Employer shall evaluate and compare only the bids determined to be substantially responsive, pursuant to ITB 27.

30.2. In evaluating the Technical Proposal of each Bid, the Procuring agency/Employer shall use the criteria and methodologies listed in the BDS and in terms of works requirement. No other evaluation criteria or methodologies shall be permitted.

30.3. The Procuring agency/Employer's evaluation of a bid will take into account:

30.3.1. the bid price, excluding provisional sums and the provision, if any, for contingencies in the summary bill of quantities, but including day work items, where priced competitively;

30.3.2. converting the amount resulting from applying above, if relevant, to a single currency in accordance with ITB 29;

30.4. 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.

30.5. If these bidding documents allow bidders to quote separate prices for different lots, and the award to a single bidder of multiple lots, the methodology of evaluation to determine the lowest evaluated lot combinations in the Form of Bid, is specified in the BDS.

30.6. If the bid, which results in the Evaluated Bid Price (Successful Bid), is seriously unbalanced or front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

Explanation:

"Unbalanced" or "front-loaded" bids consist of deliberately submitting bids with artificially high prices or unit rates for the early stages of a construction project, offset by artificially low prices or unit rates for the later stages of the project, to improve the contractor's cash flow.

31. **Domestic Preference**

31.1. If the BDS so specifies, the Procuring agency/Employer will grant a margin of preference to the domestic contractor in line with the rules, regulations, regulatory guides or instructions issued by the Authority from time to time.

32. **Determination of Successful Bid**

32.1. The Procuring agency/Employer shall compare the evaluated bids in accordance with the predefined bidding procedure, of all substantially responsive bids to determine the Successful bidder.

33. **Qualification of Bidder**

33.1. The Procuring agency/Employer shall determine to its satisfaction whether the bidder is substantially responsive and whose bid is declared as Successful bid either continues to meet (if prequalification applies) or meets (if post-qualification applies) the qualifying criteria specified in Evaluation and Qualification Criteria.
Note: In case of international bidding, the parameters for incorporation or licensing within Pakistan may be fulfilled as part of post qualification.

33.2. The determination shall be based upon an examination of the documentary evidence of the bidder's qualifications submitted by the bidder, pursuant to ITB 11.

33.3. Prior to contract award, the Procuring agency/Employer will verify that the successful bidder (including each member of a JV) is not blacklisted/debarred. The Procuring agency/Employer will conduct the same verification for each sub-contractor proposed by the successful bidder.

34. **Sub-Contractors**

34.1. The bidder shall provide details regarding any specialized sub-contractor to the Procuring agency/Employer. In case change of sub-contractors, the bidder shall promptly notify the Procuring agency/Employer and obtain approval for replacement of sub-contractors.

34.2. Bidders may propose sub-contracting up to the percentage of total value of contracts or the volume of works as specified in the BDS.

35. **Abnormally Low Financial Bid**

35.1. A procuring Agency may reject abnormally low bids in accordance with the KPP Rules 2014. The decision of the Procuring agency/Employer to reject a bid and reasons for the decision shall be recorded in the procurement proceedings and promptly communicated to the bidder concerned. Moreover, the Procuring agency/Employer shall not incur any liability solely by rejecting abnormally bid

Guidance for Procuring agency/Employer:

An abnormally low bid means, in the light of the Procuring agency/Employer's estimate and of all the bids submitted, the bid appears to be abnormally low by not providing a margin for normal levels of profit. In order to identify the Abnormally Low Bid (ALB) following approaches can be considered to minimize the scope of subjectivity:

35.1.1. Comparing the bid price with the cost estimate;

35.1.2. Comparing the bid price with the bids offered by other bidders submitting substantially responsive bids; and

35.1.3. Comparing the bid price with prices paid in similar contracts in the recent past either government- or development partner-funded.

35.2. The Procuring agency/Employer will determine to its satisfaction whether the bidder that is selected as having submitted the successful bid is qualified to perform the contract satisfactorily, in accordance with the criteria listed in ITB 11

35.3. The determination will take into account the bidder's financial and technical capabilities. It will be based upon an examination of the

documentary evidence of the bidder's qualifications submitted by the bidder, pursuant to ITB 11, as well as such other information as the Procuring agency/Employer deems necessary and appropriate. Factors not included in these bidding documents shall not be used in the evaluation of the bidders' qualifications.

35.4. Procuring agency/Employer may seek "Certificate for Independent Price Determination" from the bidder and the results of reference checks may be used in determining award of contract.

Explanation: *The Certificate shall be furnished by the bidder. The bidder shall certify that the price is determined keeping in view of all the essential aspects such as raw material, its processing, value addition, optimization of resources due to economy of scale, transportation, insurance and margin of profit etc.*

35.5. An affirmative determination will be a prerequisite for award of the contract to the bidder. A negative determination will result in rejection of the bidder's bid, in which event the Procuring agency/Employer will proceed to the next ranked bidder to make a similar determination of that bidder's capabilities to perform satisfactorily.

F. AWARD OF CONTRACT

36. **Criteria of Award**

36.1. Subject to ITB 36 and 37, the Procuring agency/Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has been declared as Successful Bidder, provided that such bidder has been determined to be:

36.1.1. eligible in accordance with the provisions of ITB 3;

36.1.2. is determined to be qualified to perform the Contract satisfactorily; and

36.1.3. Successful negotiations have been concluded, if any.

37. **Negotiations**

37.1. The Committee of the Procuring agency/Employer may negotiate with the Most Advantageous Bidder relating to the following areas:

37.1.1. a minor alteration to the technical (drawings, design technical specifications) details of the statement of works;

37.1.2. Methodology, work plan, staffing in view to streamline the work;

37.1.3. a minor amendment to the Particular conditions of Contract;

37.1.4. finalizing payment arrangements;

37.1.5. clarifying details that were not apparent or could not be finalized at the time of Bidding;

37.2. Where negotiation fails to result into an agreement, the Procuring agency/Employer may invite the next ranked bidder for negotiations. Where negotiations are commenced with the next ranked bidder, the Procuring agency/Employer shall not reopen earlier negotiations.

38. **Procuring agency/Employer's Right to reject All Bids**

38.1. The procuring agency has the right to reject all bids in accordance with the KPP Rules 2014. However, the Authority (i.e. KPPRA) may call from the Procuring agency/Employer the justification of those grounds.

39. **Notification of Award**

39.1. The procuring agency shall announce and publish the evaluation result in accordance with the KPP Rules 2014.

39.2. Where no complaints have been lodged, the bidder whose bid has been accepted will be notified of the award by the Procuring agency/Employer prior to expiration of the bid validity period through EPADS. However, the Procuring agency/Employer shall not award any procurement contract at least for five (05) days after the announcement of final evaluation report. The notification letter (herein after and in the condition of the contract and contract form called "Letter of Acceptance"

will specify the sum that the Procuring agency/Employer will pay the successful bidder in consideration for the execution and completion of the works as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price).

39.3. The notification of award will constitute the formation of the Contract, subject to the bidder furnishing the Performance Security (or guarantee) in accordance with ITB 41 and signing of the contract in accordance with ITB 40.

39.4. Upon the successful bidder’s furnishing of the performance security (or guarantee) pursuant to ITB 41, the Procuring agency/Employer will promptly notify each unsuccessful bidder, the name of the successful bidder and the Contract amount and will discharge the Bid Security or Bid Securing Declaration of the bidder(s) pursuant to ITB 17.

40. **Signing of Contract**

40.1. Promptly after notification of award, Procuring agency/Employer shall send the successful bidder the draft agreement, incorporating all terms and conditions as agreed by the parties to the contract.

40.2. Immediately after the Redressal of grievance by the GRC, and after fulfillment of all conditions precedent of the Contract Form, the successful bidder and the Procuring agency/Employer shall sign the contract.

40.3. Where no formal signing of a contract is required, work order issued to the bidder shall be construed to be the contract.

41. **Performance Security (or Guarantee)**

41.1. After the receipt of the Letter of Acceptance, the successful bidder, within the specified time, shall deliver to the Procuring agency/Employer a Performance Guarantee in the amount and in the form stipulated in the BDS and PCC, denominated in the type and proportions of currencies in the Letter of Acceptance and in accordance with the Conditions of Contract.

41.2. If the Performance Guarantee is provided by the successful bidder and it shall be in the form specified in the BDS which shall be in any of the

following:

41.2.1. certified cheque, cashier’s or manager’s cheque, or bank draft;

41.2.2. irrevocable letter of credit issued by a scheduled bank of Pakistan or in the case of an irrevocable letter of credit issued by a foreign bank, the letter shall be confirmed or authenticated by a scheduled bank of Pakistan;

41.2.3. bank guarantee confirmed by a reputable local bank or, in the case of a successful foreign bidder, bonded by a foreign bank; or

41.2.4. surety bond callable upon demand issued by any reputable surety or insurance company.
Any Performance Guarantee submitted shall be enforceable in Pakistan.

41.3. Failure of the Most Advantageous Bidder to comply with the requirement of ITB 40 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security or declare blacklisted (in case bid securing declaration is submitted) in which event the Procuring agency/Employer may make the award to the next most advantageous bidder or reinitiate the procurement process afresh (as a case may be).

42. **Advance Payment**

42.1. Advance payment will be provided to the bidder in percentage and in the manner as agreed by the both parties in terms of Conditions of the Contract.

42.2. The Procuring agency/Employer will provide an advance payment as stipulated in the Conditions of Contract, subject to a maximum amount, as stated and/or Conditions of the Contract. The advance payment request shall be accompanied by an advance payment security (guarantee) in the form provided in Section X. For the purpose of receiving the advance payment, the bidder shall make and estimate of, and include in its bid, the expenses that will relate to the purchase of equipment, machinery, materials, and on the engagement of labor during the first month beginning with the date of the Procuring agency/Employer’s “Notice to Commence” as specified in the PCC.

43. **General Performance of the Bidders**

43.1. The Procuring agency/Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts / works. The Procuring agency/Employer may seek information / report from the previous employer for consideration. However, the Procuring agency/Employer shall incorporate such parameters in the evaluation criteria and accordingly decide the fate of the bid submitted.

44. **Corrupt & Fraudulent Practices**

44.1. Procuring agencies (including beneficiaries of Government funded projects and procurement) as well as Bidders/Suppliers/Contractors under Government financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts, and will avoid to engage in any corrupt and fraudulent practices.

G. GRIEVANCE REDRESSAL & COMPLAINT REVIEW MECHANISM

45. Grievance Redressal

45.1. Grievance Redressal shall be carried out in accordance with the KPPRA, rules i.e. Redressal of grievances by the procuring agency and “Redressal of Grievances Regulations”.

H. MECHANISM OF BLACKLISTING

46. Mechanism of Blacklisting

46.1. The Procuring agency/Employer shall proceed Blacklisting of Bidders/Contractors in accordance with KPP Rules 2014 rule i.e. Blacklisting and “Blacklisting and Debarment of Bidders or Contractors.

Bid Data Sheet

Bid Data Sheet (BDS)

The following specific data for the procurement of works shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITBs). Whenever there is a conflict, the provisions herein shall prevail over those in ITBs.

A. Introduction

ITB Number
Amendments of, and Supplements to, Clauses in the Instruction to Bidders

ITB Number1.1

Name of Procuring agency/Employer: **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad)**

The subject of procurement is: **Installation of HVAC WORKS at Academic Block of SZABMU**

Period for completion of the works **245 Days**

Commencement date execution of the works: **14 Days**

Type of Procurement**:Local**

ITB Number2.1

Financial year for the operations of the Procuring agency/Employer: **2026-27**
Name of Project [insert: name and summary description of the Project if any]

Name of financing institution: [insert: name if any]

Name and identification number of the Contract: **P168510**

ITB Number3.1

JV/Consortium or Association Allowed: **No**

Maximum number of members in the joint venture shall be: **Nil**.

B. Bidding Documents

ITB Number6.4

The Bidders may seek clarifications through **EPADS v2.0**: **Last Clarification Date: Saturday, November 14, 2026**
Pre-Bid Meeting: Monday, November 9, 2026 11:00 AM

C. Preparation of Bids

ITB Number8.1

The Language of all correspondences and documents related to the Bid is: **English**

ITB Number 5.1 & 9.1

The following documentsmust be includedto constitute the Bid

1. Technical Bid 7.1.1 Volume - I • Section I - Invitation for Bids • Section II - Instruction to Bidders (ITBs); • Section III - Bidding Data Sheet (BDS); • Section IV - Eligible Countries; • Section V – Evaluation and Qualification Criteria; • Section VI – Works Requirements Technical Specifications & Schedule of Requirement

ITB Number9.4 (b)

Other procurement specific documentation requirements are:

Nationality, PEC Registration, Affidavit for No-Blacklisting, Litigation history/in case of no-litigation affidavit of no-litigation, Registration with FBR & Sales tax registration, active tax payer status, bidder experience of completed & on-going projects along with a letter of award / completion certificates, detail CVs, qualification & experience certificates of nominated staff, annual audit reports for the last 3-years

ITB Number12.4

The Bid price will be/will not be subject to the price adjustment **Nil**.

ITB Number12.6

The Bid price shall be adjusted in accordance with Schedule-A to Bid – “Schedule of Adjustment Data” if available.

ITB Number13.1

Bidders to quote entirely in**Pak rupees (PKR)**

ITB Number15.1

The Bid Validity period shall be **148 Days** days.

ITB Number16.1

The amount of Bid Security shall be (insert amount)

The currency of the Bid Security shall be: **PKR**.

ITB Number16.2

The Bid Security shall be in the form of:**Pay Order, Bank Guarantee, Demand Draft**

D. Submission of Bids

ITB Number19.1

The deadline for Bid submission is:**Tuesday, November 17, 2026 11:00 AM**
Address for submission of Original Bid Security:**Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory**

ITB Number21.1
The Bid opening shall take place at:**EPADS v2.0**
Day : ***Tuesday***
Date: ***November 17, 2026***
Time : ***11:30 AM***

ITB Number27.1
The currency that shall be used for Bid evaluation and comparison purposes to convert all Bid prices expressed in various currencies is: **PKR Only**
The source of exchange rate shall be: **Nil**
The date of exchange rate shall be: **Nil**

ITB Number28.2 &28.5
Least Cost Based Selection (LCBS)
see Evaluation Criteria

ITB Number29.1
Domestic preference to apply.
Domestic preference:**No**
Preference to domestic or national suppliers or contractors shall be provided in accordance with policies of the Federal Government and/or in accordance with

the regulations issued by the Authority.
If Yes, The percentage for the domestic preference alongwith calculation formula is provided in the evaluation and qualification criteria.

ITB Number32.2
Sub-contracting is allowed? : **Yes**

30% of the total value of the contract.

39.1 The Performance Security (or guarantee) shall be **10.00%**
39.2 The Performance Security (or guarantee) shall be in the form of:**Bank Guarantee**

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Eligibility Criteria

All Active Taxpayers shall be eligible to participate in the procurement process, unless expressly excluded or otherwise restricted under the Eligibility Criteria specified by the Procuring Agency.

Required Registration
NADRA CITIZENSHIP (CNIC/NICOP) FBR (NTN) FBR (GSTN) PEC

Eligibility Criteria	Document
Valid registration with Pakistan Engineering Council (PEC) Category C-3 and at least in Specialization Codes: ME-01 (PEC Registration License Specialization Codes: ME-01)	Yes
History of Non-Performing Contracts Non-performance of a contract did not occur as a result of contractor default for last 15 years.	Yes
Pending Litigation Bidder’s financial position and prospective long-term profitability sound according to criteria established in Financial Capabilities below and assuming that all pending litigation will be resolved against the Bidder	Yes
Litigation History No consistent history of court/ arbitral award decisions against the Bidder since 1st January 2011.	Yes
No- Blacklisting Bidder has never been blacklisted	Yes

Evaluation Criteria

Least Cost Based Selection (LCBS)

Weightage

Technical Evaluation %
100

Technical Marks	100
Passing Marks	**50**
Specific HVAC Works Experience	
Specific HVAC Works Experience – Completed Projects Successful experience as Contractor in execution of Supply, Installation, Testing and commissioning projects of similar nature and volume i.e. HVAC Works upto 300 TR or above over the last ten (10) years (Central System/ VRF System completed during last 10-years) Form. EXP – 4.2 (a) i. The applicants must provide Taking Over/ Completion Certificate of completed projects. No marks will be given to the projects for which above certificate is not provided. ii. Applicant shall provide complete information of the projects including scope, cost and tonnage of refrigerant etc. iii. Proportionate marks on the basis of share in JV agreement will be awarded to each partner, for projects executed as Joint Venture (JV). (Quantitative)(Doc Required) 6 Projects **(30)** 5 Projects **(25)** 4 Projects **(20)** 3 Projects **(15)**	30
Specific HVAC Works Experience – In-hand Projects	

Specific HVAC Works Experience – In-hand Projects Experience as Contractor in execution of Supply, Installation, Testing and commissioning projects of similar nature and volume i.e. HVAC Works upto 300 TR or above (Central System/ VRF System). (Quantitative)(Doc Required) 3 Projects **(5)** 2 Projects **(3)**	5
Specific HVAC Works Experience – O&M Experience	
HVAC maintenance Contracts/ O&M during Defects Liability/ Notification Period having minimum one-year duration executed during last five (05) years (O&M of Central System/ VRF System completed during last 5-years). i. The applicants must provide Award Letter for maintenance projects/ O&M during Defects Liability/ Notification Period. No marks will be given to the projects for which above certificate is not provided. ii. Applicant shall provide complete information of the projects including scope, cost and tonnage of refrigerant etc. (Quantitative)(Doc Required) 3 Projects **(5)** 2 Projects **(3)**	5
Personnel Capabilities	
Form PER-1 and PER-2 Provide the following for each personnel, failing which, no marks will be awarded: a. verifiable proof of employment with the bidder of the proposed staff b. detailed CV c. valid PEC Registration for Engineers d. Diploma Certificates of DAE staff (Quantitative)(Doc Required) Project Manager - B.Sc / BE Mechanical Engineer, having 8-years of relevant Experience Site/ Planning Engineer - B.Sc / BE Mechanical Engineer, having 5-years of relevant Experience Installation Supervisor (Mechanical) - DAE Mechanical, having at least 8 years of Relevant experience Installation Supervisor (Electrical) - DAE Electrical, having at least 8 years of Relevant experience **(15)** Project Manager **(6)** Site/ Planning Engineer **(4)** Installation Supervisor (Mechanical) **(3)** Installation Supervisor (Electrical) **(2)**	15

Equipment Capabilities	
Form EQU: (SECTION VI) Proportionate marks will be awarded if minimum number of Form EQU: (SECTION VI) Proportionate marks will be awarded if minimum number of corresponding equipment is less than minimum required. Provide an undertaking on judicial stamp paper to the effect that the listed equipment is available with the firm and will be made available, as and when required, for the Project. (Sheet Cutting Machine- Min Qty 1 (Marks 2) Sheet Bending Machine- Min Qty 1 (Marks 2) Sheet Rolling Machine- Min Qty 1 (Marks 2) Flair Machine for Cu pipes- Min Qty 1 (Marks 2) Electric Arc Bending -Min Qty 1 (Marks 2) Drill Machine- Min Qty 1 (Mark 1) Crimping Machine-Min Qty 1 (Mark 1) Lock Former - Min Qty 1 (Mark 1) Grooving Machine - Min Qty 1 (Mark 1) Machine Cutting- Min Qty 1 (Mark 1) (Quantitative) (Doc Required)	15
Financial Soundness (The minimum annual volume of construction work (Annual Turn-Over) during any of the last three years:)	
FORM FIN - 3.1, FIN - 3.2 and FIN 3.3 The bidder shall submit Audited financial statements for the last three years duly certified by the Chartered Accounts Firms shall submit copies of Credit Line Facility (in specific name of the Project). No marks shall be awarded, if the audited financial statements & credit line facility are not provided. (Quantitative)(Doc Required) if the Turnover is more than PKR. 450 million. **(15)** if the Turnover is in range of PKR. 350 million to PKR. 450 million **(8)**	15
Financial Soundness (The amount of Working Capital (Current Assets – Current Liabilities) & credit facilities (in specific name of the Project), net of other construction commitments of the construction, shall be as under:)	
FORM FIN - 3.1, FIN - 3.2 and FIN 3.3 The bidder shall submit Audited financial statements for the last three years duly certified by the Chartered Accounts Firms shall submit copies of Credit Line Facility (in specific name of the Project). No marks shall be awarded, if the audited financial statements & credit line facility are not provided. (Quantitative)(Doc Required) if the Working Capital is more than PKR. 120 million. **(15)** if the Working Capital is in range of PKR. 100 million to PKR. 120 million **(8)**	15

Jobs/Lots

Jobs Without Lots :

Job	Delivery Schedule	Quantity	Bid Security
HVAC- Construction of Academic Block of SZABMU	**Address:** CACademic block of SZABMU, Sector G-8/3, Islamabad Capital Territory**Schedule:** 248 Days**Quantity:** 588/Qty	588/Qty	9000000 PKR

Work Specifications and Market Rates

Jobs Without Lots :

Job: HVAC- Construction of Academic Block of SZABMU

Specifications / Requirements:

Sr. No	Ref. No.	Description	Unit	Qty	Rate		Amount
1	1	Construction of Academic Block of SZABMU - HVAC works	Tons	588	779683.16	(Rupees Seven hundred seventy-nine thousand six hundred eighty-three and sixteen hundredths only)	458453650

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Ref. No.	Description	Unit	Qty	Rate		Amount
						GRAND TOTAL:	Rs458,453,650.00

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Scope of Work

The scope of work primarily includes the supply, installation, testing, commissioning, operation and maintenance of HVAC system of Academic Block of SZABMU, Islamabad lying within the boundaries and limits shown on the Drawings and any such additional areas adjacent thereto as may be designated by the Engineer from time for the construction to be performed under the Contract, and all such areas and additional areas shall comprise the Site.

Brief Description

The scope of work primarily includes the supply, installation, testing, commissioning, operation and maintenance of HVAC system of Academic Block of SZABMU, Islamabad lying within the boundaries and limits shown on the Drawings and any such additional areas adjacent thereto as may be designated by the Engineer from time for the construction to be performed under the Contract, and all such areas and additional areas shall comprise the Site.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Price Schedule

For Individual Jobs

#	Job Title	Quantity	Unit Price (PKR)	Total Price (PKR)	Delivery Location	Delivery Period / Year	Country of Origin
1							
2							

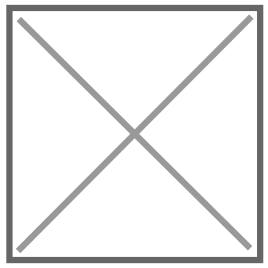
For Lots

#	Lot Title	Total Lot Price (PKR)	Country of Origin
1	[Lot 1 Title]		

Jobs Media

Jobs Without Lots:

Job: HVAC- Construction of Academic Block of SZABMU



PUBLIC PROCUREMENT REGULATORY AUTHORITY
(PPRA)
EPADS

General Conditions of Contract

Red Book:
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The Conditions of Contract are the “General Conditions” which form part of the “Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer (“Red book”) Second edition 2017” published by the Federation Internationale Des Ingenieurs – Conseils (FIDIC) and the following “Particular Conditions” which shall complement the General Conditions of the Contract.

The successful Bidder, upon contract award, shall be required to furnish two (02) copies of aforementioned “General Conditions” for incorporation in the Works Contract.

International Federation of Consulting Engineers (FIDIC) FIDIC
Bookshop – Box- 311 – CH – 1215 Geneva 15, Switzerland
Fax: +41 22 799 49 054
Telephone: **+41 22 568 0500**
E-mail: **fidic@fidic.org**
Website: www.fidic.org
FIDIC code: ISBN13: 978-2-88432-084-9

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Special Conditions of Contract

PARTICULAR CONDITIONS OF CONTRACT (PCC)

Particular Conditions
(Mandatory Provisions not to be amended/substituted)

The Particular Conditions (PCC) complement the General Conditions (GCC) to specify dates, contractual requirements, and special circumstances related to the Works. The PCC consists of two parts, Part A - Contract Data and Part B - Special Provisions. The provisions to be found in the Special Provisions (Particular Conditions - Part B) take precedence over the equivalent provisions found under the same Sub-Clause number(s) in the General Conditions, and the provisions of the Contract Data (Particular Conditions - Part A) take precedence over the Special Provisions (Particular Conditions - Part B).

PART A - Contract Data

Sub-Clause 1.1.27
Defects Notification Period (DNP): **365** Days

Sub-Clause 1.1.31
Employer's name & address: **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad), Purchase Officer Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory**

Sub-Clause 1.1.35
Engineer's name & address: to be decided at time of Appointment of Engineer

to be decided at time of Appointment of Engineer

Sub-Clause 1.1.84
Time for Completion: **245** days for whole of the works

Sub-Clause 1.3 (a)(ii)
Agreed method of electronic transmission: Not Agreed

Sub-Clause 1.3 (d)
Address of Empoyer for Communications: **Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory**
Address of Engineer for Communications:

to be decided at time of Appointment of Engineer

Address of Contractor for Communications: ----------

Sub-Clause 1.4
Contract shall be governed by the law of: **Islamic Republic of Pakistan**
Ruling language: **English**
Language for communications: **English**

Sub-Clause 2.1
After receiving the Letter of Acceptance, the Contractor shall be given right of access to all or part of the Site within: **14** days after Commencement Date

Sub-Clause 2.4
Employer's financial arrangements:

HEC- PSDP Funded

Sub-Clause 3.2 (e)(ii)
Engineer's Duties and Authority: **Variation resulting in an increase of the Accepted Contract Amount in excess ofone percent (1%)subject to accumulative Variations not exceeding five percent (5%)of the Accepted Contract Amount**

Sub-Clause 4.2
Performance Security (as percentage of the Accepted Contract Amount in Currencies): 10.00%
Form of Performance Guarantee: **Bank Guarantee**

Sub-Clause 4.2.1
List of Insurance Companies:

Not Applicable

Sub-Clause 4.7.2
period for notification of errors in the items of reference: **Twenty Eight (28) days**

Sub-Clause 4.19
Period of payment for temporary utilities: **Each Month**

Sub-Clause 5.1 (a)
Maximum allowable accumulated value of work subcontracted (as a percentage of the Accepted Contract Amount): **30** %

Sub-Clause 5.1 (b)
Parts of the Works for which subcontracting is not permitted: 70

None

Sub-Clause 6.5
Normal working hours on the Site: **8**

Sub-Clause 8.3
Number of additional paper copies of programmes: **04**

Sub-Clause 8.8 & 14.15(b)
Delay Damages payable for each day of delay **0.12**% of the Accepted Contract Amountfor delay in completion of whole of the Works

Sub-Clause 8.8
Maximum amount of Delay Damages **10.00 %** of the Accepted Contract Amount

Sub-Clause 8.14
Applicability of Incentives for Early Completion **No**

Sub-Clause 12.3
Percentage profit (Not more than 10%): **Nil**

Sub-Clause 13.4.(b)(ii)
Percentage rate to be applied to Provisional Sums for overhead charges and profit: **Twenty Five percent**

(25%)

Sub-Clause 14.2
Total Advance Payment: **Fifteen percent (15%) of the Accepted Contract Amount excluding Provisional Sums payable in the currencies and proportions in which the Accepted Contract Amount is payable**

Sub-Clause 14.2.1
Advance Payment Insurance **Not Allowed**

Sub-Clause 14.2.3
Percentage deductions for the repayment of the Advance Payment: Deduction shall be made at the amortization rate of 17.5 % of the value of the Works executed of each IPC as provided in paragraph (i) of Sub-Clause GCC 14.3, starting from 2nd IPC provided that the advance payment shall be completely repaid prior to the time when 90% of the Accepted Contract Amount less Provisional Sums has been certified for payment. It may be more than 17.5% in the last instalment to ensure full repayment.

Sub-Clause 14.3
Period of payment **One Month**

Sub-Clause 14.3(b)
Number of additional paper copies of Statements: **04**

Sub-Clause 14.3 (iii)
Percentage of retention: **Seven percent (7%)**

Sub-Clause 14.3 (iii)
Limit of Retention Money (as a percentage of the Accepted Contract Amount): **Five percent (5%)**

Sub-Clause 14.5(b)(i)
Plant and Materials for payment when shipped: **Plant and Materials under Bill of "Imported Plant and Materials"**

Imported Plants and Materials

Plant and Materials for payment when shipped: Plant and Materials under Bill of "Imported Plant and Materials" shall be paid as per payment conditions mentioned in Sub-Clause 14.3 (xi)

Sub-Clause 14.5(c)(i)
Plant and Materials for payment when delivered to the Site: Plant and Non Perishable Materials

Plants and Materials Onsite

Plant and Non-Perishable Materials under Bill of "Imported Plant and Materials" shall be paid as per payment conditions mentioned in Sub-Clause 14.3 (xi)

Sub-Clause 14.6.2
Minimum amount of Interim Payment Certificate (IPC): **Yes**
The Minimum Amount IPC is 30 Million
[Employer to give value not exceeding one fifth of the average expected value of Interim Payment Certificate]

Sub-Clause 14.7(a)
Period of payment of Advance Payment to the Contractor**: 14 days**

Sub-Clause 14.7b(i)
Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.6: **28** days

Sub-Clause 14.7b(ii)
Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.13 (Final Payment)**: 28** days

Sub-Clause 14.7(c)
Period for the Employer to make final payment to the Contractor**: 56** days

Sub-Clause 14.8
Financing charges for delayed payment Local Currency (PKR):
6-Month KIBOR (Offer) +3% per annum.
Foreign Currency:
USD
6-Month SOFR (Secured Overnight Financing Rate for USD) +1% per annum.

EURO
6-Month EURIBOR (EURO Interbank Offered Rate for EURO) +1% per annum.

Others
Appropriate rates +1% (for other foreign currencies, Ref. Schedule-A, A-4 to Bid).

Sub-Clause 14.11.1(b)
Number of additional paper copies of draft Final Statements**: 04**
[insert number of copies say six (06)]

Sub-Clause 14.15
Currencies of payment of Contract Price: **as stated in the Table Schedule of Adjustment Data of Schedule A (if Given)**

Sub-Clause 14.15(a)(i)
Proportions or amounts of Local and Foreign currencies: **as stated in the Table Schedule of Adjustment Data of Schedule A (if Given)**

Sub-Clause 14.15(c)
Currencies and proportions for payment of Delay Damages: **as stated in the Table Schedule of Adjustment Data of Schedule A (if Given)**

Sub-Clause 14.15(f)
rates of exchange: **as stated in the Table IV of Schedule A (If Given)**

Sub-Clause 17.2(d)
Forces of nature, the risks of which are allocated to the Contractor: **Nil**

Sub-Clause 19.1
Permitted deductible limits:
i) insurance required for the Works: **Ten percent (10%) of loss amount on each & every loss**
ii) insurance required for Goods: **Nil**
iii) insurance required for liability for breach of professional duty: **Nil**
iv) insurance required against liability for fitness for purpose (if any is required): **Nil**

v) insurance required for injury to persons and damage to property: **Nil**
vi) insurance required for injury to employees: **Nil**
vii) other insurances required by Laws and by local practice : **Nil**

Periods for submission of insurance:
a) evidence of insurance: Not later than the Commencement Date
b) relevant policies: Within twenty eight (28) day from the Commencement Date

Sub-Clause 19.2.1(b)
Additional amount to be insured (as a percentage of the replacement value): 15% of the replacement value (Accepted Contract Amount)
Sub-Clause 19.2.2
Extent of insurance required for Goods: From Ex-Works (i.e., works, factory, warehouse, etc) to delivery at the Site
Amount of insurance required for Goods: Full replacement value

Sub-Clause 19.2.3(a)
Amount of insurance required for liability for breach of professional duty: Full replacement value of the Works to be designed by the Contractor

Sub-Clause 19.2.3(b)
Insurance required against liability for fitness for purpose: **Yes**

Sub-Clause 19.2.3
Period of insurance required for liability for breach of professional duty: Until the date of issuance of Performance Certificate

Sub-Clause 19.2.4
Amount of insurance required for injury to persons and damage to property: Injury to person and Fatal case: in accordance with Workmen Compensation Act
Damage to Property: The Amount of Insurance Required for Person Injury is in Accordance with work man compensation Act.
The Amount of Insurance Required for Damage to Property is PKR 01 Million without limit to the No. of Incident. as per his assessment of the adjoining property(ies) other than the Works]
without limit to the number of incidents

Sub-Clause 19.2.6
Other insurances required by Laws and by local practice: All insurances as applicable, to the extent of execution of the project, under Federal and Provincial laws of Islamic Republic of Pakistan

Sub-Clause 21.1
Time for appointment of the DAAB: Within 28 days from the Commencement Date.
In case the Accepted Contract Amount is lesser than PKR one (01) billion, appointment of the DAAB shall be made when Dispute arises between the Parties.

Sub-Clause 21.1
The DAAB shall comprise 1
[insert either “a sole Member” or “Three Members”]
[For a Contract estimated to cost above PKR 2.5billion, the DAAB shall comprise of three members. For a Contract estimated to cost between PKR1billion and PKR2.5billion, the DAAB may comprise of three members or a sole member. For a Contract estimated to cost less than PKR1billion, a sole member is recommended.]

Sub-Clause 21.1
List of proposed members of DAAB
- proposed by Employer

Sole Member

- proposed by Contractor
[to be inserted at the time of signing of the Contract]
1._____
2._____
3._____

Sub-Clause 21.2
Appointing entity (official) for DAAB members Managing Director Public Procurement Regulatory Authority (PPRA) or Chairman Pakistan Engineering Council (PEC) from the list of PEC approved arbitrators published at its website

Sub-Clause 21.6
Rules of Arbitration: PEC Rules of Conciliation and Arbitration or Pakistan Arbitration Act of 1940, if the former is inactive.
The place of Arbitration shall be in the Employer's country: **Islamabad, pakistan**
[Insert name of city]

Particular Conditions

PartB - Special Provisions

1.1 Definitions

1.1.76 "Specification"
Following is added at the end:
"and consists of two parts i.e.,
i) "Part A - Specific Provisions"; and
ii) "Part B - Technical Provisions"."

1.2 Interpretation

"and" is deleted from the end of sub-paragraph (i) and added at the end of sub-paragraph (j).
Sub-paragraph (k) is added:
"(k) The word "tender" is synonymous with "bid" the word tenderer with "bidder", the words "tender documents" with "bidding documents" and "Schedule of Prices" with "Bill of Quantities", as applicable."
1.5 Priority of Documents The documents listed at (a) through (k) of this Sub-Clause are deleted and substituted with the following:
(a) the Contract Agreement;
(b) the Letter of Acceptance;
(c) the Letter of Bid;
(d) the Particular Conditions Part A - Contract Data;
(e) the Particular Conditions Part B - SpecialProvisions;
(f) the General Conditions;

(g) the Specification Part A - SpecificProvisions;
(h) the Specification Part B- Technical Provisions;
(i) the Drawings;
(j) the completed Schedules to Bid includingBillof Quantities;
(k) the JV Undertaking (if the Contractor is a JV); and
(l) any other documents forming part of the Contract.
The addenda/corrigenda, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

1.6 Contract Agreement

In the last line of the 1st paragraph the text “shall be borne by the Employer” is substituted by “shall be reimbursed by the Employer to the Contractor”.

3.1 The Engineer

In sub-paragraph (a) the text “as defined in the Pakistan Engineering Council Act, 1975 (Act No.V of 1976)” are added after the words “professional engineer”.

3.2 Engineer’s Duties and Authority

The Engineer shall obtain the consent in writing of the Employer before taking action under the following Sub-Clauses of these Conditions:
(a) Consenting to the subcontracting of any part of the Works under Sub-Clause 5.1 [Subcontractors]
(b) Any action under Sub-Clauses 8.9 [Employer’s Suspension] and 8.12 [Prolonged Suspension]
(c) Issuance of “Taking Over Certificate” under Sub-Clause 10.1 [Taking Over the Works and Sections].
(d) Issuing the “Performance Certificate” under Sub-Clause 11.9 [Performance Certificate].
(e) Sub-Clause 13.1 [Right to Vary]: instructing a Variation, except;
(i) in an emergency situation as determined by the Engineer, or
(ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Contract Data.
(f) Sub-Clause 13.3 [Variation Procedure]: approving a proposal for Variation submitted by the Contractor in accordance with Sub-Clause 13.3.2 [Variation by Request for Proposal] or 13.2 [Value Engineering].
(g) Certifying release of second half of the Retention Money under Sub-Clause 14.9 [Release of Retention Money].
(h) Issuing Final Payment Certificate under Sub-Clause 14.13 [Issue of FPC].
(i)

Issue of FPC Sub Clauses

56 days

*[insert Sub-Clause number (not Sub-Clause 3.7 [Agreement or Determination]
Any such requirement shall not be applied to any action by the Engineer under Sub-Clause 3.7 [Agreement or Determination], as stated in Sub-Clause 3.2 [Engineer’s Duties and Authority] of the General Conditions. Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer.

Following is added after the words “the Employer’s consent is required” in 4th paragraph:
“stating that the Employer’s consent has been obtained for that specified authority”

4.2 Performance Security

4.2.1 Contractor’s Obligations
The entity issuing the Performance Security and its form shall be as under:
The Performance Security shall be, at the option of the Contractor,issuedin the prescribed form included in the Bidding Documents,by(a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan or (c)an Insurance Companylisted in the Contract Data and rated by PACRA/VIS ofratingas provided in Table below:
Accepted Contract Amount (In Eq. PKR million) Minimum Rating of Insurance Companies
Up to 1000 A (+)
1001 to no limit AA
In case of Joint Venture, the Performance Security shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.
Following paragraph is added at the end of this Sub-Clause:
“The amount of Performance Security shall be reducedto 50%following issue of the Taking-Over Certificate for the whole of the Works under Clause 10 of Conditions of Contract.”

4.3 Contractor’s Representative

In second paragraphthe text “professional engineer as defined in the Pakistan Engineering Council Act, 1975 (Act No. V of 1976) (having temporary licence in case of foreign engineer under Section 12 of the Pakistan Engineering Council Act, 1975 (Act No. V of 1976)” are added after the words “qualified, experienced”.
In the 3rd paragraph the words “28 days” are substituted by “14 days”. In 2nd line of 4thparagraph the text “or appoint a replacement” is substituted by “except appointment of a suitable temporary replacement is deployed at the Site”

4.4 Contractor’s Documents

4.4.2 As-Built Records
First paragraph is deleted and the text in the last paragraph is substituted with the following:
“The Contractor shall furnish to the Engineer 6 copies, one reproducible and one electronic copy(provided the Engineer has made available to the Contractor editable form of the Drawings)of all Drawings amended to conform to the Works as built.In case the Engineer does not make available to the Contractor editable form of the Drawings, the Contractor shall furnish to the Engineer as-built data for incorporation in the Drawings. Upon receipt of PDF versions of the as-built drawings prepared by the Engineer, the Contractor shall furnish to the Engineer 6copies and one reproducible of these Drawings.
The price of such Drawings shall be deemed to be included in the Contract Price.”
Following Sub-Clause is added:
4.4.4 ShopDrawings
The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.
Review and approval by the Engineer shall not exceed 21 days and be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and the Engineer’s review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.

4.8 Health and Safety Obligations

The following text is added at the end ofthis Sub-Clause:
In the event of work being carried out outside the normal working hours and in the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the

Works where the night work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer.

4.20 Progress Reports

At the end of sub-paragraph (g) the word "and" is deleted and at the end of sub-paragraph (h) the full stop (.) is replaced with ";", and the following new sub-paragraphs are added as:
(i) planned programme for the execution of the Works for next 56 days to enable the Engineer to determine its programme of inspection and testing;
(j) monthly summery of daily job record indicating weather conditions, deployment of Contractor's Equipment, labour employment, local material procurement and material import, if any; and
(k) salient contractual and project information.

5.1 Subcontractors

Add the following text at the end of paragraph (ii):
"underSchedule to Bid"
The following is added at the end of the last paragraph of Sub-Clause 5.1:
"All subcontracts relating to the Works shall include provisions which entitle the Employer to require the subcontract to be assigned to the Employer under sub-paragraph (a) of Sub-Clause 15.2.3 [After Termination].
The Contractor shall give reasonable opportunity to contractors from Islamic Republic of Pakistan for subcontracts for the Works, and endeavour to employ such contractors as Subcontractors."

5.2 Nominated Subcontractors

5.2.2 Objection to Nomination
In sub-paragraph (c), "and" is deleted from the end of (i);
"." at the end of (ii) is replaced with: ", and".
The following is then added as (iii):
"(iii) be paid only if and when the Contractor has received from the Employer payments for sums due under the Subcontract referred to under Sub-Clause 5.2.3 [Payment to nominated Subcontractors]."

6.1 Engagement of Staff and Labour

The following paragraph is added at the end of the Sub-Clause:
"The Contractor shall, to the extent practicable and reasonable, employ staff (not less than 50%) and labour (not less than 85%) with appropriate qualifications and experience from sources within the Islamic Republic of Pakistan."

6.7 Health and Safety of Personnel

The existing text is substituted with the following:
"In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose. The Contractor shall also provide all other medical services and appoint a health and safety officer at Site if stated in the Specifications. In case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means."

6.8 Contractor's Superintendence

Insert at the end of sub-paragraph (a) of this Sub-Clause:
"or, if not, the Contractor shall make competent interpreters available during all working hours, in a number sufficient for those persons to properly perform their superintendence duties"
The following text is added at the end of this Sub-Clause:
“The Contractor’s authorized representative and his other engineers working at site shall possess valid registration with the Pakistan Engineering Council.
The Contractor’s authorized representative at Site shall be authorized to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract.”

6.12 Key Personnel

The following is inserted at the end of the last paragraph:
“If any of the Key Personnel are not fluent in this language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.”
The following Sub-Clauses 6.13 to 6.26 are added at the end of Sub-Clause 6.12:

6.13 Foreign Personnel

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use all reasonable endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor’s personnel.
The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

6.14 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor’s Personnel for the purposes of or in connection with the Contract.

6.15 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor’s Personnel.

6.16 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor’s Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

6.17 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor’s Personnel.

6.18 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

6.19 Festivals and Religious Customs

The Contractor shall respect the Country's recognized festivals, days of rest and religious or other customs.

6.20 Funeral Arrangements

The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of its local employees who may die while engaged upon the Works.

6.21 Forced Labour

The Contractor, including its Subcontractors, shall not employ or engage forced labour which 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 labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

6.22 Child Labour

The Contractor, including its Subcontractors, shall not employ or engage child labour in accordance with relevant law(s) in force in Islamic Republic of Pakistan.

6.23 Employment Records of Workers

The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Contractor's Records].

6.24 Workers' Organizations

The Contractor shall comply with the relevant labour laws of Pakistan which recognize workers' rights to form and to join workers' organizations/Trade Union of their choosing and to bargain collectively without interference.

6.25 Non-Discrimination and Equal Opportunity

The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices.
Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure nondiscrimination and equal opportunity, including for specific groups such as women, persons with disabilities, migrant workers and children (of working age in accordance with Sub-Clause 6.22).

6.26 Epidemics

In the event of any out-break of illness of epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government or the local medical or

sanitary authorities for the purpose of overcoming the same.

7.7 Ownership of Plant and Materials

The following is added before the first paragraph:
“Except as otherwise provided in the Contract,”
The following is added at the end of the Sub-Clause:
"No Plant and/or Materials that is the property of the Employer shallbe removed from the Site. If it becomes necessary to:
(i) remove any item of such Plant from the Site for the purposesof repair, the Contractor shall give a Notice, with reasons, tothe Engineer requesting consent to remove the defective ordamaged item off the Site. This Notice shall clearly identifythe item of defective or damaged Plant, and shall give detailsof: the defect or damage to be repaired; the place to whichdefective or damaged item of Plant is to be taken for repair;the transportation to be used (and insurance cover for suchtransportation); the proposed inspections and testing off theSite; and the planned duration required before the repaireditem of Plant shall be returned to the Site. The Contractorshall also provide any further details that the Employer mayreasonably require; or
(ii) replace any item(s) of such Plant and/or Materials, theContractor shall give a Notice, with reasons, to the Engineerclearly identifying the item(s) of Plant and/or Materials to bereplaced, and giving details of the due date of delivery tothe Site of the replacement item(s).
Where any item of Plant and/or Materials has become the propertyof the Employer under this Sub-Clause before it has been deliveredto the Site, the Contractor shall ensure that such an item is notmoved except for its delivery to the Site.
The Contractor shall indemnify and hold the Employer harmlessagainst and from the consequences of any defect in title orencumbrance or charge (except any reasonable restrictionarising from the intellectual property rights of the manufacturer orproducer) on any item of Plant and/or Materials that has becomethe property of the Employer under this Sub-Clause."
The following Sub-Clause7.9 is added after Sub Clause 7.8:

7.9 Use of Pakistani Materials and Services

The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.

8.1 Commencement of Works

The following is added before the first paragraph:
“After signing of the Contract Agreement by both Parties,” and thereafter the word “The” is replaced with the word “the”.

8.5 Extension of Time for Completion

The following is added after paragraph (c):
“for last five years”.
The following Sub-Clause 8.14 is added after Sub-Clause 8.13:

8.14 Incentives For Early Completion

If Contract Data does not state applicability of incentives for early completion, this Sub-Clause shall not apply.
The Contractor shall be entitled subject to Sub-Clause 20.2 [Claims for Payment and/or EOT] to bonus payment if the Works and/or each Section is completed earlier than the Time for Completion for the Works or Section (as the case may be). The amount of bonus for early completion of the Works and/or each Section shall be upto a limit and at a rate to 50% of the relevant limit and rate of delay damages prescribed in

Contract Data and shall be paid for every day which shall elapse between the relevant Date of Completion of the Works or Section and the relevant Time for Completion.
For the purposes of calculating any bonus payment, the applicableTime for Completion stated in the Contract Data is fixed and noadjustments of this time by reason of granting an EOT will beallowed.
The following Sub-Clause 11.12 is added after Sub-Clause 11.11:

11.12 Supervisory Assistance During DNP

If provided under the Schedule of Prices, the Contractor shall provide supervisory assistance to the Employer during the DNP for the Works. Such supervisory assistance shall be as described in the Specification for the purpose of supporting the Employer's operation and maintenance of the Plant for the period specified in the Schedule of Prices after the Date of Completion.

12.2 Method of Measurement

The following paragraph is added at the end of the Sub-Clause:
“Summary of measured quantity for payment shall be delineated item-wise under four headsnamely; “Schedule of Prices Quantity”, “Quantity Executed To-date”, “Quantity Certified Previously” and “Net Quantity Executed under this Certificate”.

12.3 Valuation of the Works

The following text is added at the end of fifth paragraph of the Sub-Clause:
“Sum of overhead charges and profit for sub-paragraph (a) shall be Twenty Five percent (25%)”.

13.4 Provisional Sums

The following paragraph is inserted as the penultimate paragraph:
“The Provisional Sum shall be used to cover the Employer’s share of the DAAB members’ fees and expenses, in accordance with Clause 21. No prior instruction of the Engineer shall be required with respect to the work of the DAAB. The Contractor shall submit the DAAB members’ invoices and the satisfactory evidence of having paid 100% of such invoices as part of the substantiation of those Statements submitted under Sub-Clause 14.3.

13.6 Adjustments for Changes in Laws

The following paragraphsare added at the end of the Sub-Clause:
“Notwithstanding the foregoing, the Contractor shall not be entitled to an extension of time if the relevant delay has already been taken into account in the determination of a previous extension of time and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the Table of Adjustment Data in accordance with the provisions of Sub-Clause 13.7 [Adjustments for Changes in Cost].”

14.1 The Contract Price

The following is added at the end of the Sub-Clause:
“Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry an approved re-export bond or bank guarantee, valid until the Time for Completion plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment and spare parts, and callable in the event the Contractor's Equipment is not re-exported from the Country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the

Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon re-export of individual items of Contractor's Equipment or spare parts, or upon the completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare part to be re-exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable Laws. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to re-exported; and (b) on the initial imported value of the Contractor's Equipment and spare parts remaining in the Country after completion of the Contract. Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining."
[The Employer may change or delete this Sub-Clause as per Project requirements]

14.2 Advance Payment

14.2.1 Advance Payment Guarantee
The entity issuing the Advance PaymentGuaranteeand its form shall be as under:
The Advance PaymentGuarantee shall be in the form of Guarantee issued by (a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistanor (c)an Insurance Companylisted in the Contract Data and rated by PACRA/VIS ofrating as provided in Table below:
Accepted Contract Amount (In Eq. million PKR) Minimum Rating of Insurance Companies
Up to 1000 A (+)
1001 to no limit AA
In case of Joint Venture, the Advance PaymentGuarantee(s)shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.

14.6 Issue of IPC

14.6.1 The IPC
In the first line of the 1st paragraph the words "28 days" are substituted by "14 days".

14.7 Payment

The words "or through crossed cheque in favour of the Contractor or JV partners. The Payment to JV partners shall be made at the request of the Joint Ventures in the ratio of their shares specified by them" are added at the end of the Sub-Clause.

14.8 Delayed Payment

In the first paragraph, third line, the words "compounded monthly" are deleted.
The text of 2nd paragraph is deleted and substituted with the following:
"The Employer shall pay to the Contractor compensation at the rate stated in the Contract Data."

14.9 Release of Retention Money

The following is added at the end of Sub-Clause 14.9:
"Unless otherwise stated in the Contract, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment by the Engineer, the Contractor shall be entitled to substitute a guarantee, in the form annexed to the Particular Conditions or in another form approved by the Employer and issued by a schedule bank selected by the Contractor, for the second half of the Retention Money. The Contractor shall ensure that the guarantee is in the amounts and currencies of the second half of the Retention Money and is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security. On receipt by the Employer of the required guarantee, the Engineer shall certify, and the Employer shall pay the second half of

the Retention Money. The release of the second half of the Retention Money against a guarantee shall then be in lieu of the release after the latest of the expiry dates of the Defects Notification Periods. The Employer shall return the guarantee to the Contractor within 21 days after receiving a copy of the Performance Certificate.

If the Performance Security required under Sub-Clause 4.2 is in the form of a demand guarantee, and the amount guaranteed under them when the Taking-Over Certificate is issued is more than half of the Retention Money, then the Retention Money guarantee will not be required. If the amount guaranteed under the Performance Security when the Taking-Over Certificate is issued is less than half of the Retention Money, the Retention Money guarantee will only be required for the difference between half of the Retention Money and the amount guaranteed under the Performance Security.

15.2 Termination for Contractor's Default

15.2.1 Notice
Following text is added at the end of sub-paragraph (h) of this Sub-Clause:
"For the purposes of this Contract, corrupt and fraudulent practices have been defined in Public Procurement Rules 2004."
15.2.3 After Termination
The word "and" at the end of sub-paragraph (ii) of paragraph (b) is deleted the following paragraph is added after sub-paragraph (iii):
"(iv) all Employer-Supplied Materials and/or Employer's Equipment madeavailable to the Contractor in accordance with Sub-Clause 2.6 [Employer-Supplied Materials and Employer's Equipment], and"

15.4 Payment after Termination

The following text is added at the end of this Sub-Clause:
"The Employer shall be entitled to sell any of the Contractor's Equipment, Temporary Works and unused materials and apply the proceeds of sale towards payment of any debt due from the Contractor to the Employer under this Clause including any outstanding payments to the Subcontractors.

16.2 Termination by Contractor

16.2.1 Notice
The sub-paragraph (j) is deleted in its entirety.
At the end of sub-paragraph (i) "; or" is replaced with "." and at the end of sub-paragraph (h) ";" is replaced with "; or".
In sub-paragraph (f) "84 days" are replaced with "180 days" and text "for reasons not attributable to the Contractor" is added at the end.

16.3 Contractor's Obligations After Termination

Sub-paragraph (c) is deleted and replaced with:
"(c) deliver to the Engineer all Employer-Supplied Materials and/orEmployer's Equipment made available to the Contractor in accordance with Sub-Clause 2.6 [Employer-Supplied Materials and Employer's Equipment]; and
(d) remove all other Goods from the Site, except as necessary for safety,and leave the Site."

17.1 Responsibility for Care of the Works

After the two instances of "Goods" in the last paragraph, the words "Employer-Supplied Materials and/orEmployer's Equipment" are added.
The following Sub-Clause 17.7 is added after Sub-Clause 17.6:

17.7 Use of Employer's Accommodation/Facilities

The Contractor shall take full responsibility for the care of the items of the Employer's facilities and/or accommodation, if any, as detailed in the Specification, from the date of use and/or occupation by the Contractor until the date on which such use and/or occupation is re-vested in the Employer.
If any loss or damage happens to any of the above items during a time while the Contractor is responsible for its care, arising from any cause other than a cause for which the Employer is responsible or liable, the Contractor shall promptly rectify the loss or damage at the Contractor's risk and cost.

18.1 Exceptional Events

The words "or disorder" are replaced with "disorder or sabotage" in sub-paragraph (c) of the Clause.

18.4 Consequences of an Exceptional Event

The following is added at the end of sub-paragraph (b) after deleting the ".":
", including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Exceptional Events, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 19.2 [Insurance to be provided by the Contractor]."

18.5 Optional Termination

In sub-paragraph (c), the words "and necessarily" areadded after the words "was reasonably".

19.1 General Requirements

Following text is added at the end of first paragraph:
"The Contractor shall immediately after the date of the Letter of Acceptance submit the draft of insurance policies for the Employer's consent."
Following text is added at the end of third paragraph:
"The Contractor shall, within the respective periods stated in the Contract Data submit to the Engineer and the Employer a) evidence that the insurances described in this Clause have been effected, and b) copies of policies of the insurances described in Sub-Clauses 19.2.1, 19.2.4 and 19.2.5."

19.2 Insurance to be provided by the Contractor

19.2.5 Injury to employees
The words "sickness, disease" are deleted in the third line of first paragraph.

The following Sub-Clause is added after Sub-Clause 19.2.6:
19.2.7 Insurance Company
"The Contractor shall be obliged to place all insurances described in this Clause with insurers listed in the Contract Data and rated byPACRA/VISofrating as provided in Table below:

Accepted Contract Amount (In Eq. million PKR)	Minimum Rating of Insurance Companies
Up to 1000	A (+)
1001 to no limit	AA

21.6 Arbitration

The word "international" is deleted in the sixth line of first paragraph. The text of sub-paragraph (a) is substituted with the following:
"the Dispute shall be finally settled under the Rules of Arbitration, specified in the Contract Data;"
The following Clauses are added after Clause 21

22 Custom Duty

[Employer may incorporate provisions where applicable. However, in order to make the bid more balanced, the payment of Customs Duties should be the responsibility of the Employer.]

23 Taxes

The Contractor, Subcontractors and their employees shall be liable to pay income tax, withholding tax, super tax and other taxes on income arising out of the Contract. The rates and prices as stated in the contract shall be deemed to cover all such taxes.

24 Integrity Part

If it is found and established at any stage that the Contractor or any of his Subcontractors, agents or servants have violated or involved in violation of the Integrity Pact signed by the Contractor then the Employer shall be entitled to :

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agent or servants;

(b) terminate the Contract; and

(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agent or servants.

The termination under sub-paragraph(b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clause 15.1 to 15.4 and the payment under Sub-Clause 15.4 shall be made after having deducted the amounts due to the Employer under sub-paragraph(a) and (c) of this Sub-Clause.

Appendix General Conditions of Dispute Avoidance/Adjudication Agreement

12 Disputes Under DAAB Agreement

In the first paragraph, third, fourth and fifth line, the text "under the Rules of Arbitration of the International Chamber of Commerce 2017……shall apply" is substituted with "under the Arbitration Act 1940 by sole arbitrator appointed by the Managing Director Public Procurement Regulatory Authority or Chairman Pakistan Engineering Council."

Bid Securing Declaration

FORM OF BID SECURING DECLARATION

Date:
No.:
Alternative No.: ***P168510***

To: **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad), Purchase Officer Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory**

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 be blacklisted and henceforth cross debarred for participating in respective category of public procurement proceedings for a period of (not more than) six months, if fail to abide with a bid securing declaration, however without indulging in corrupt and fraudulent practices, if we are in breach of our obligation(s) under the Bid conditions, because we:

(a) have withdrawn our Bid during the period of Bid validity specified in the Letter of Bid; or
(b) having been notified of the acceptance of our Bid by the Procuring agency/Employer during the period of Bid validity, (i) fail or refuse to sign the Contract; or (ii) fail or refuse to furnish the Performance Security (or guarantee), 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 expiration of our Bid.

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.]

Contract Form

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ (month) 20_____ between **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad), Purchase Officer Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory** (hereinafter called the "Employer") of the one part and _____ (hereinafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz., **Installation of HVAC WORKS at Academic Block of SZABMU (*P168510*)** should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents, in the order of priority, after incorporating addenda, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement:

a) This Contract Agreement;
b) The Letter of Acceptance;
c) The Letter of Bid;
d) The Particular Conditions Part A - Contract Data;
e) The Particular Conditions Part B - SpecialProvisions;
f) The General Conditions;
g) The Specifications Part A - SpecificProvisions;
h) The Specifications Part B- Technical Provisions;
i) The Drawings;
j) The Completed Schedules to Bid including Schedule of Prices;
k) the JV Undertaking (if the Contractor is a JV); and
l) [Employer to insert any other documents forming part of the Contract]

The addenda/corrigenda,if any, (Excluding part relating to Instructions to Bidders alongwith Bidding Data) shall be deemed to have been incorporated at the appropriate places in the "Documents forming the Contract".

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of the Contactor Signature of Employer

(Seal) (Seal)

Signed, Sealed and Delivered in the presence of:

Witness Witness

(Name, Title and Address) (Name, Title and Address)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

DAAB Agreement

[All italicised text and any text within square brackets (except sub-clause headings) in this form of agreement is for use in preparing the form and should be deleted from the final product].

Name and details of the Contract Installation of HVAC WORKS at Academic Block of SZABMU
_____

This Agreement made the _____day of _____ [month], _____ [year], between

Name and contact details of the Employer **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad), Purchase Officer**
Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory
+92-333-539-2247
purchaseofficer@szabmu.edu.pk

Name and contact details of the Contractor _____ (name)
_____ (address)
_____ (telephone)
_____(email / other contact details);

Name and contact details of the DAAB Member _____ (name)
_____ (address)
_____ (telephone)
_____(email / other contact details);

("DAAB Agreement")

Whereas:
A. the Employer and the Contractor have entered (or intend to enter) into the Contract;
B. under the Contract, the "DAAB" or "Dispute Avoidance/Adjudication Board" means the sole member or three members (as stated in the Contract Data of the Contract) so named in the Contract, or appointed under Sub-Clause 21.1 [Constitution of the DAAB] or Sub-Clause 21.2 [Failure to Appoint DAAB Members] of the Conditions of Contract;
C. the Employer and the Contractor desire jointly to appoint the above-named DAAB Member to act on the DAAB as:
a. the sole member of the DAAB, and where this is the case, all references to the "Other Members" do not apply; or
b. one of three members / chairman [delete the one which is not applicable] of the DAAB and, where this is the case, the other two persons are:

_____ (name) _____ (name)
_____ (address) _____ (address)
_____(telephone) _____(telephone)
_____(email/ other contact details) _____ (email/other contact details)

the "**Other Members**"; and
D. the DAAB Member accepts this appointment.

The Employer, Contractor and DAAB Member jointly agree as follows:

1. The conditions of this DAAB Agreement comprise:
(a) Clause 21 [Disputes and Arbitration] of the Conditions of Contract, and any other provisions of the Contract that are applicable to the DAAB's Activities; and
(b) the "General Conditions of Dispute Avoidance/Adjudication Agreement", which is appended to the General Conditions of the "Conditions of Contract for Construction" Second Edition 2017 published by FIDIC ("GCs"), as amended and/or added to by the following provisions.
2. [Details of amendments to the GCs, if any. For example:
In the procedural rules annexed to the GCs, Rule _ is deleted and replaced by: " … "]
3. The DAAB Member shall be paid in accordance with Clause 9 of the GCs. The currency of payment shall be _____.
In respect of Sub-Clauses 9.1 and 9.2 of the GCs, the amounts of the DAAB Member's monthly fee and daily fee shall be:
monthly fee_____ per month, and
daily fee of_____ per day
(or as otherwise set under Sub-Clause 9.3 of the GCs).
4. In consideration of the above fees, and other payments to be made to the DAAB Member in accordance with the GCs, the DAAB Member undertakes to act as DAAB Member in accordance with the terms of this DAAB Agreement.
5. The Employer and the Contractor shall be jointly and severally liable for the DAAB Member's fees and other payments to be made to the DAAB Member in accordance with the GCs.
6. This DAAB Agreement shall be governed by the law of _____ (if not stated, the law that governs the Contract under Sub-Clause 1.4 of the Conditions of Contract).

SIGNED by:_____	SIGNED by:_____	SIGNED by:_____
Print name:_____	Print name:_____	DAAB Member
Title: _____	Title:_____	Title:_____
for and on behalf of the Employer	for and on behalf of the Contractor	
in the presence of	in the presence of	in the presence of
Witness:_____	Witness:_____	Witness:_____
Name:_____	Name:_____	Name:_____
Address:_____	Address:_____	Address:_____
_____	_____	_____
Date:_____	Date:_____	Date:_____

FORM OF MOBILIZATION ADVANCE GUARANTEE/ BOND

Guarantee No._____ Date _____

WHEREAS _____ (hereinafter called the 'Employer')
has entered into a Contract for _____
(Particulars of Contract)
with _____ (hereinafter called the "Contractor').
AND WHEREAS, the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Pak Rupees _____ (PKR _____) which amount shall be advanced to the Contractor as per provisions of the Contract.
AND WHEREAS, the Employer has asked the Contractor to furnish Guarantee to secure the mobilization advance for the performance of his obligations under the said Contract.
AND WHEREAS, _____

(hereinafter called the “Guarantor”) at the request of the Contractor and in consideration of theEmployer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.
NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.
Notice in writing of any default,on the part of the Contractor, of which the Employer at his discretion of making decision, shall be given by the Employer to the Guarantor, and on such first written demand, payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.
This Guarantee shall remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until _____whichever is earlier.
(Date)
The Guarantor's liability under this Guarantee shall not in any case exceed the sum of
PKR _____ (PakRupees _____).
This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against paymentsfrom Interim Payment Certificates of the Contractor provided that the Guarantor

agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

Guarantor
(Scheduled Bank/ Insurance Company)

Signature _____
Name _____
Title _____

WITNESS:

1. _____

_____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Retention Money Security
Demand Guarantee

_____ [Guarantor letterhead or SWIFT identifier code]
Beneficiary: _____ [Insert name and Address of Employer]
Date: _____[Insert date of issue]
RETENTION MONEY 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 Contractor, which in the case of a joint venture shall be the name of the joint venture] (hereinafter called "the Contractor") has entered into Contract No. _____ [insert reference number of the contract] dated _____ with the Employer, for the execution of _____ [insert name of contract and brief description of Works] (hereinafter called "the Contract").
Furthermore, we understand that, according to the conditions of the Contract, the Employer retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when the Taking-Over Certificate has been issued under the Contract and the first half of the Retention Money has been certified for payment, payment of [insert the second half of the Retention Money orifthe amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security and, if required, the ES Performance Security] is to be made against a Retention Money 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] () [amount in words] upon receipt by us of the Employer'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 your needing to prove or show grounds for your demand or the sum specified therein.
A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Employer's bank stating that the second half of the Retention Money as referred to above has been credited to the contractor on its account number _____ at _____ [insert name and address of Contractor's bank].
This guarantee shall expire no later than the …. day of ……, 2…, and any demand for payment under it must be received by us at the office indicated above on or before that date.

_____
[signature(s)]

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

Integrity Pact

Integrity Pact

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

Contract Number: Contract Value: Contract Title:

Dated:

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

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

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

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

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

Name of Employer: …… Name of Bidder/Contractor: ……
Signature: …… Signature: …….
[Seal] [Seal]

Performance Guarantee Form

FORM OF PERFORMANCE SECURITY

Guarantee No._____
Executed on _____
Expiry date _____

Name of Guarantor with address: _____

Name of Principal (Contractor) with address:_____

Penal Sum of Security (express in words and figures) _____

Letter of Acceptance No. _____Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the **Shaheed Zulfiqar Ali Bhutto Medical, University, Islamabad (Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad), Purchase Officer Office # 522, 5th Floor, SOD SZABMU, Sector G-8/3, Ravi Road., Islamabad Capital Territory** (hereinafter called the Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ _____

(Name of Contract) for the **Installation of HVAC WORKS at Academic Block of SZABMU** (**P168510**) _____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause11, Defects After Taking Over, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defense under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated

above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall decide, whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

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

Guarantor
(Schedule Bank/ Insurance Company)
Signature: _____
Name: _____
Title: _____

Corporate Guarantor (Seal)

WITNESS:

1.
_____
_____

2.

_____
_____
Name, Title & Address

Annexure

List of Recommended Manufacturer

Information (Read-Only)

See Form Under Additional Forms and Documents: **List of Recommended Manufacturer** (page number: 89)

Technical Submission

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Submission** (page number: 96)

Special Conditions of Contract

Information (Read-Only)

See Form Under Additional Forms and Documents: **Special Conditions of Contract** (page number: 109)

Special Provision

Information (Read-Only)

See Form Under Additional Forms and Documents: **Special Provision** (page number: 117)

Drawings

Information (Read-Only)

See Form Under Additional Forms and Documents: **Drawings** (page number: 136)

Financial Submissions - Volume IV

Financial Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Financial Submissions - Volume IV** (page number: 149)

Price Adjustment of Foreign Exchange Rate

Information (Read-Only)

See Form Under Additional Forms and Documents: **Price Adjustment of Foreign Exchange Rate** (page number: 167)

Technical Specification volume-II

Information (Read-Only)

See Form Under Additional Forms and Documents: **Technical Specification volume-II** (page number: 169)

Procurement Forms

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Past Construction Experiences

See Form Under Additional Forms and Documents: **Past Construction Experiences** (page number: 285)

Contractor's Key Personnel Representative and Their Schedules

See Form Under Additional Forms and Documents: **Contractor's Key Personnel Representative and Their Schedules** (page number: 291)

Financial Resources

See Form Under Additional Forms and Documents: **Financial Resources** (page number: 295)

Past Experience and Completed Contracts

See Form Under Additional Forms and Documents: **Past Experience and Completed Contracts** (page number: 296)

Historical Contract Non-Performance, and Pending Litigation and Litigation History

See Form Under Additional Forms and Documents: **Historical Contract Non-Performance, and Pending Litigation and Litigation History** (page number: 297)

Current Contracts and Their Progress

See Form Under Additional Forms and Documents: **Current Contracts and Their Progress** (page number: 299)

Financial Capacity and Net Worth Evaluation Form

See Form Under Additional Forms and Documents: **Financial Capacity and Net Worth Evaluation Form** (page number: 300)

Average Annual Turnover

See Form Under Additional Forms and Documents: **Average Annual Turnover** (page number: 302)

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Additional Forms and Documents

List of Recommended Manufacturer

Equipment and materials specified with brand names have been provided in order to establish a standard of performance and do not necessarily indicate a preference for a particular manufacturer or material.

The names of manufacturers given below are to indicate the level of quality and performance anticipated by the Engineer/ Employer. Other makes may be accepted provided that the quality and performance of such equipment, in the opinion of the Engineer and subject to approval of the Employer, are at least equal to or better than the equipment/ product offered by the recommended manufacturer.

The acceptance of equipment/ materials offered by these manufacturers will be subject to compliance of offered models /materials with the specifications, capacity and/or performance requirements.

Onus lies with the Contractor for establishing the genuineness of any material/product for its make and origin.

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)
1	DX-Type Air Handling Units and Matching Condensing Units	Boreas Carrier Climaventa Mcquay/daikin Euroclima Rhoss Trosten Mekar Sital klima Klimallco Klsklima HSK System air Untes Danhum bush Skm Trane York	Malaysia/ Korea/ China/ Turkey/ Thailand/ Japan/ Middle East
2	VRF/Condensing Units	Toshiba Daikin Hitachi Samsung General Hisense Lg Gree Career Media	West Europe/ Thailand/ China/ Korea

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)
		Trane	
		York	
3	HVAC Auto Controls	Honeywell	USA, Canada, West Europe
		Siemens	
		Tac	
		Schneider electric	
		Johnson controls	
		Reliable controls	
4	Fans		
4a	Tube Axial & Centrifugal Fans	Air Mech	Pakistan, USA, Spain, UK, Germany, Europe
		Aerotech	
		Green heck	
		Sasa metal industries	
		Loren cook	
		Pen berry	
		Sisteven	
		Sodeca	
		Rosenberg	
		Casals	
4b	Propeller Fans	Pak Fans	Pakistan, USA, Spain, UK, Germany, Europe
		Climax	
		Millat	
		Air mech	
		Aerotech	
		Sasa Metal Industries	
		Green heck	
		Loren cook	
		Penberry	
		Sisteven	
		Rosenberg	
		Casals	
5	uPVC	Beta	Pakistan
		Popular	

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)
		Galco	
6	Copper Pipes	Mueller	USA, West Europe, Korea, China
		Golden dragon	
		Crane	
		Trox	
7	Duct Insulation, Pipe Insulation & Sound Liners	Afico	Kuwait / Saudi Arabia / Turkey / Europe / USA
		Izocam	
		Kimmco	
		Knauf	
		Armaflex	
		Durkflex	
		Aerofoam	
		Ode	
8	Galvanized Iron Sheets	Pakistan Steel Mills, International Steels Limited, International Industries Limited, Aisha Steel Mills Limited Or Any Other (South African/New Zealand Make Available Locally, Approved by Engineer.	Pakistan, South Africa, New Zealand
9	Air Inlets & Outlets	Mehran	Pakistan
		Thermac	
		Eap	
		Air control steelcraft	
		Sa industries	
		Aerotech	
		Pak priemer	
10	Paints	ICI Dulux	Pakistan
		Nippon	
		Master	
		Berger	
11	Fasteners, Hanger Rods, Rawal Plugs, Supports, Channels etc.	Fisher	As per Manufacturer's Facility
		Hilti	
		Diamond walraven	
		Sikla	

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)
		Spit	
		Inka	
		Mungo	
		Norm, rawal plug	
		Index	
12	White Glue	Foster	USA, West Europe
		Movilith	
13	Duct Sealants	Dow Corning	USA, Turkey, Pakistan
		Zahbia	
14	DX-Type Split Air Conditioning Units	Toshiba	Malaysia/ Korea/ China/ Turkey/ Thailand/ Japan
		Daikin	
		Hitachi	
		Samsung	
		Lg	
		Gree	
		Midea	
		York	
		Pearl	
		Mitsubishe	
		Ogeneral	
15	Low Voltage Panels	SA Electric	Pakistan
		Siemens	
		Elmetec	
		PEL	
		Bilal Switchgear	
		Mesi	
		Ceeco	
		JEI	
		Electrech	
		Quality switchgear	
		Mtech	
16	LV and Control Cables & Wires (600/1000V)	Pakistan Cables	Pakistan
		Pioneer cables	

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)
		Newage cables	
		Fast cables	
17	PVC Conduit, Fittings & Accessories	Beta	Pakistan
		Popular	
		Turkplast	
		Galco	
18	Steel Conduit, Cable Trays, Fittings & Accessories	Hilal Industries	Pakistan
		International Industries Limited	
		Ashraf Industries	
		Jamal	
		Nib	
		Pioneer	
19	MCCBs, MCB & Magnetic Contactors	Schneider	France, Italy, Germany, Japan
		Siemens	
		Abb	
		Legrand	
		Terasaki	
		Panasonic	
		Telemecanique	
20	ACBs & ELCBs	ABB	France, Italy, Japan
		Siemens	
		Schneider	
		Terasaki	
		Legrand	
21	Relays & Timers	Finder	Italy, Turkey
		Inter	
22	PFI Relays	Nokian	Finland, Turkey
		Entes	
23	Voltmeters & Ammeters	Circulor	Italy, Turkey
		Revalco	
		Inter	

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)
		Entes	
24	Current Transformers & Voltage Transformers	Circulor	Italy, Pakistan
		Revalco	
		Fico	
25	Selector Switches & Push Buttons	Legrand	Sweden, France, Italy
		Kraus & Naimer	
		ABB	
		Bosch	
		Clipsal	
		Revalco	
26	Indication Lamps	Legrand	France, Italy
		Breter	
		ABB	
		Telemecanique	
27	Terminal Blocks	Legrand	France, Italy, Japan
		ABB	
		Phoenix	
		Cabour	
28	Programmable Logic Controllers	Siemens	Germany, Italy
		ABB	
29	Photoelectric EE Switches	National Photoelectric	Japan
30	LV Change Over Switches & Capacitors	Socomec	France, Germany, Japan, Pakistan
		Ducati	
		ABB	
		Amber	
		Nokian	
31	Isolators Switches	Bretter	Italy, Germany
		Siemens	
32	HEPA Filters	Camfil	West Europe/Turkey
		Dogu	
		MGT	

S.No.	Equipment & Materials	Recommended Manufacturers & Suppliers	Country (Origin, Manufacturing, Assembling, Testing & Supply)

Notes:

1. All equipment/materials must be supplied from authorized representatives and or sole distributors of the Manufacturers in Pakistan.
2. Manufacturer's authorization certificate must be provided.
3. Compliance to the aforementioned country (origin, manufacturing, assembling, testing & supply) for offered/supplied equipment/materials is mandatory. Approved equivalent may only be acceptable from same country of origin.
4. In case of any approved equivalent brand other than the aforementioned recommended manufacturers/suppliers, the Bidder shall submit the following additional information for prequalification purpose

   a. Approved equal brand shall have minimum 30 years of international experience and 5 years of local experience with authorized distribution in Pakistan.
   b. Compliance statement of specifications from the manufacturer of the equipment/materials.
   c. Comparison of each part/system of the proposed brand with one of the aforementioned recommended brands including quality certificates and test reports etc.
   d. Approved equivalent brands shall be clearly mentioned in the technical bid by the Bidder including the aforesaid information complete in all respect. Approved equivalent bid will only be acceptable after review at the time of Bid Evaluation.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

Bill of Quantities

Volume-IV covering Bill of Quantities

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Technical Proposal

- **Site Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Construction Schedule**
- **List of Major Equipment**
- **Bidder’s Equipment Data**

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Site Organization

The Bidder is required to submit an organization proposed for the Works, together with their names, qualifications, experience, positions held and their nationalities.

Designation	Name	Summary of Qualifications Experience, Present, Position and Nationality

- **Head Office:**

- **Site Office:**
  Contractor's Representative
  Site Superintendent
  Supervising Engineer
  Plant Erectors
  Construction Supervisors
  Other Key Staff

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Method Statement

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

1. Organization Chart indicating head office and field office personnel involved in management and supervision, engineering, equipment maintenance and purchasing.

2. Mobilization, in Pakistan, the type of facilities including personnel accomodation, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.

3. The method of executing the Works, the procedures for installation of equipment and machinery and transportation of equipment and materials to the site and providing all services including but not limited to supply of power, water, maintenance of facilities, safety and security and all what is required for completion of works in accordance with the Contract.

4. Quality control / Quality assurance measures to be adopted including procedures to be followed for carrying out all tests required under specifications.

5. The Bidder while preparing his methodology for performing and executing the works shall also consider the following:

a) The timely completion of the Project as per the time provided in Contract Data.

b) The Contractor while filling out the list of major equipment required at site, shall ensure that the equipment requirement is in consonance with the construction requirement.

c) The Contractor is not restricted to carry out the work in single shift. The Contractor should note that if he plans to execute the work in more than single shift than all costs related to the additional superintendence to be provided by the Engineer will be borne by the Contractor. Procedure for such additional costs will be worked out and finalized between the Contractor and Engineer with the consent of the Employer.

d) The portions of the Site shall be made available to the Contractor in coordination with other Contractors working at site. The Contractor shall prepare the work programme accordingly.

Mobilization Schedule

The Bidder is required to submit a narrative outlining the method for mobilization of works and arrangement of preliminaries.

In accordance with the Particular Conditions, Sub-Clause 4.1, the Contractor shall not carry out mobilization to Site unless the Engineer gives consent.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Construction Schedule

Pursuant to Sub-Clause 8.3 of the General Conditions, the whole of the Works, and each Section (if any), shall be completed within the Time for Completion for the Works or Section (as the case may be) stated as hereunder and mentioned in Contract Data:

Description	Time for Completion (Days)
Whole Works	245 days

The Bidder shall provide, the Construction Schedule in the bar chart (CPM, PERT or any other to be specified herein) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the Works and Sections of the Works may meet Employer's completion targets in days noted above and counted from the Commencement Date.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

LIST OF MAJOR EQUIPMENT

The Bidder will provide a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment.

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed.

Sr. No.	Description of Equipment	Total No. of Equipment to be brought/installed/erected for site during execution of Works	Minimum Mandatory Equipment to be brought/installed/erected at site prior to release of 2nd Part of Mobilization Advance
1.	Sheet Cutting Machine	1 No.	1 No.
2.	Sheet Bending Machine	1 No.	1 No.
3.	Sheet Rolling Machine	1 set.	1 set.
4.	Flair Machine for Cu pipes	1 No.	1 No.
5.	Electric Arc Bending Machine	1 No.	1 No.
6.	Drill Machine	1 No.	1 No.
7.	Crimping Machine	1 No.	1 No.
8.	Lock Former	1 No.	1 No.
9.	Grooving Machine	1 No.	1 No.
10.	Cutting Machine	1 No.	1 No.

Note:

The bidder while preparing his methodology for performing and executing the works and listing out Major Equipment (required to complete the Works in the specified Time Schedule) in this Appendix shall consider the above mentioned minimum requirement of Construction Equipment to be brought/installed/erected at site.

ORGANIZATIONAL CHART
FOR THE
SUPERVISORY STAFF AND LABOUR

MINIMUM MANDATORY STAFF REQUIREMENT:

The Contractor shall arrange the following staff at site immediately upon commencement of works:

Designation	***Nos.***	***Minimum Qualification***	***Min. Relevant Working Experience***
(A)	***(B)***	***(C)***	***(D)***
Project Manager	01	B.Sc. Mechanical Engr. with valid PEC Regd.	08 years
Site/Planning Engineer	01	B.Sc. Mechanical Engr. with valid PEC Regd.	05 years
Installation Supervisor (Mechanical)	01	B-Tech/ DAE (Mechanical)	08 years
Installation Supervisor (Electrical)	01	B-Tech/ DAE (Electrical)	08 years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form EQU: Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section V, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

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

Omit the following information for equipment owned by the Bidder.

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

Bidder's Equipment Data

BIDDER'S EQUIPMENT DATA

HVAC WORKS

Note: Data provided hereunder will be scrutinized for general conformity with requirements of Bidding Document. Acceptance of Bid will not mean acceptance of these data. The Contractor will have to submit detailed equipment submittals for approval of the Engineer in accordance with Special Provisions of Specifications later after award of Contract.

Technical catalogues are required only to substantiate the data provided in these forms. Catalogues of equipment not listed in these forms shall not be submitted and if submitted, will be ignored. Acceptance of Bid will not mean the acceptance of information given in those catalogues.

A. DX-TYPE AIR HANDLING UNITS/CONDENSING UNITS

1. Make _____
2. Country of Manufacture/Origin _____
3. Authorized Distributor in Pakistan _____
4. Component origin (imported)
   - Fan impeller _____
   - Fan motor _____
5. Dimensions of proposed AHUs been checked for suitability With reference to space available as Per Site YES/NO
6. Certificate No. _____

B. Variable Refrigerant Flow (VRF) Units

Basic Information

The Bidders need to fulfil this checklist with all information which is verifiable from manufacturer catalogue/website. The alternate/better option for any missing information shall be clearly mention in the remarks column. The Bids technical review committee is fully authorized to accept alternate option or reject equipment on the basis of missing information/ item/part/accessories etc.

Offered VRF Make:-_____

Country of Origin:- _____

Model/Series: _____

EUROVENT/AHRI/SASO certification No: - _____

Authorized Dealer in Pakistan: - _____

VRF offered model Ambient Range:- _____

EER Cooling at ARI conditions:- _____

Required Manufacturer/Authorized Dealer Certifications for equipment/model selection

VRF de-rating as per ambient conditions and refrigerant pipe length considered in Technical Proposal.

VRF complete solution including indoor units, outdoor units, controls, refnet connections, additional refrigerant will be provided by one manufacturer and will be delivered in same shipment.

Selection of outdoor unit capacity allocation and no of outdoor unit's module are made as per maximum efficiency at full and part load.

No change in the offered unit model be made by local authorized representative/manufacturer with respect to standard parts, materials, body weight, accessories, parts origin etc and international level equipment/material be delivered for the current project.

COMPLIANCE STATEMENT

Sr. No	Description	Compliance (Yes/No)	Remarks (if any)
1.	VRF is suitable for commercial use.		
2.	Full Dc inverter with step less frequency control		
3.	Internal Self Protection for over voltage, under voltage, phase, phase error, over current, overheating, bus voltage fluctuation, communication failure, motor protection etc.		
4.	Dc variable speed control for outdoor unit fans		
5.	Outdoor unit fan protection for reverse rotation		
6.	Easy and Flexible Access for Outdoor unit electrical and Machinery Panel		
7.	Refrigerant cooling technology for heat removal from main control board, inverter module and outdoor unit electrical box.		
8.	Microcomputer electronic expansion valve for automatic flow control of each indoor unit.		

Sr. No	Description	Compliance (Yes/No)	Remarks (if any)
9.	Overall Oil separation efficiency > 99.9 %		
10.	If one compressor of one module of outdoor unit stop working, the other compressors remain working		
11.	If one module of out unit fail, the other modules remain working.		
12.	Rotation technology for outdoor unit for automatic sharing equal time for operation of each module of outdoor units		
13.	The protections including compressor suction/exhaust pressure, compressor ratio protection, compressor exhaust temperature protection, compressor oil return protection, inverter temperature and voltage protection, four-way valve protection, sub cooling protection and protection from lightning is included.		
14.	Real time monitoring and detection of pipe line malfunctioning		
15.	Self-regulation for phase sequence		
16.	With one or more indoor units need repairing, they can be powered off without effecting the whole system.		
17.	Automatic dust removal function for outdoor unit by fan reverse operation.		
18.	Set points remain saved when power restored after shutdown.		
19.	Fault parameter led display in the main control board for diagnostic and maintenance		
20.	The main controller is compatible to communicate with Building Management System via multiple communication protocols like BACnet, MODBUS etc (if required)		
21.	The main central controller shall be capable to handle main functions not limited to On/OFF running state monitoring, temperature setting, access control, operation mode setting, automatic operation, malfunctioning alarms, service monitoring, Displaying and recording parameters/readings and energy monitoring		

Sr. No	Description	Compliance (Yes/No)	Remarks (if any)
22.	Relevant software for BMS monitoring be included in scope of supply if required as per scope of supply in the bidding document.		

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SECTION IX. SPECIAL CONDITIONS OF THE CONTRACT

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Special Conditions of the Contract

The Special Conditions of Contract (SCC) complement the General Conditions of Contract (GCC) to specify data and contractual requirements of the Procuring agency/ Employer/ Employer, the engineer, the sector, the overall project, and the works. In the event of a conflict, the provisions herein shall prevail over those in the GCC.

Part A – Contract Data

Contract data of the SCC, includes data to complement the GCC in a manner similar to the way in which the Bid Data Sheet complements the Instructions to Bidders.

SCC Clause Number	GCC Clause Number	Amendments of, and Supplements to, Clauses in the GCC
General Provision (GCC 1)		
1.	1.1.27	365 days
2.	1.1.31	Employer's name and address: Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), Islamabad. Name of Employer's representative: **Project Director** Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), Sector G-8/3, Islamabad Tel: 051-9107695
3.	1.1.35	_____ *[insert Engineer's name and address at the time of appointment of the Engineer]*
4.	1.1.84	245 days for whole of the Works
5.	1.3	**For notices** Procuring agency/Employer Authorized representatives name and address: Project Director Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), Sector G-8/3, Islamabad Tel: 051-9107695 Engineer's Authorized representatives name and address: ---------- *[insert Engineer's authorized representative name and address at the time of appointment of the Engineer]*

		Contractors Authorized representatives name and address: ---------- *[insert Contractor's name and address at the time of signing of the Contract]*
6.	1.4	**Governing Law;** The Applicable Law shall be: Laws of the Islamic Republic of Pakistan
7.	1.4	**Communication Language:** The Communication Language shall be: English
The Employer/ Procuring agency/Employer (GCC Clause 2)		
8.	2.1	Time for access to the Site: Within 14 days of Signing of Contract Agreement.
9.	2.4	The Employer has sufficient funds to cover the Cost of the entire Project.
The Engineer (GCC Clause 3)		
10.	3.2	Engineer's Duties and Authority: Variations resulting in an increase of the Accepted Contract Amount in excess of 1% subject to accumulative Variations not exceeding five percent (5%) of the Accepted Contract Amount.
The Contractor (GCC Clause 4)		
11.	4.2	Performance guarantee/ security will be in the form of an un-conditional and irrevocable bank guarantee from a scheduled bank in Pakistan in the amount of 10% as a percentage of the Accepted Contract Price.
12.	4.7.2(a)	**Clause 4.7 Setting out** Period for notification of errors in the items of reference*: 28 (twenty-eight) days*
13.	4.20	Number of additional paper copies of progress reports: 04
Sub-Contracting (GCC Clause 5)		
14.	5.1(a)	Maximum allowable accumulated value of work subcontracted (as a percentage of the Accepted Contract Amount): thirty percent (30%)
15.	5.1 (b)	Works for which sub-contracting is not permitted: None

Staff and Labour (GCC Clause 6)		
16.	6.5	Normal working hours 08 *(eight) hours.*
Plant, Material and Workmanship (GCC Clause 7)		
17.	7.2	Samples as required by the Engineer.
Commencement, Delays and Suspension (GCC Clause 8)		
18.	8.3	Number of additional paper copies of program: 03 copies
19.	8.8	Delay damages shall be payable for each day of delay shall be 0.12% of the Accepted Contract Amount per day, in the currency and proportions in which the Contract Price is payable. Maximum amount of delay damages is 10% of the Accepted Contract Amount.
20.	8.14	Clause 8.14 Applicability of Incentives for Early Completion: Not Applicable.
Measurement and Valuation (GCC Clause 12)		
21.	12.2	Method of measurement shall be in accordance with the reference Technical Specifications, Bill of Quantities and/ or other applicable Schedule(s) for relevant BOQ item of work.
22.	12.3	Percentage of overheads, profit and taxes: 25%
Variations and Adjustments (GCC Clause 13)		
23.	13.4 (b)(ii)	Percentage rate to be applied to Provisional Sums for overhead charges, profit and taxes is: Twenty five percent (25%)
24.	13.7	Adjustments for Changes in Cost: The Accepted Contract Amount shall be adjustable during Contract Execution as per Appendix-C.
Contract Price and Payment (GCC Clause 14)		
25.	14.2	Total advance payment shall be ten percent (10%) of the Accepted Contract Amount excluding Provisional Sums payable in the currency and proportion of Contract.
26.	14.2.3	Repayment of Advance payment: Deduction shall be made at the amortization rate of 15% of the value of the Works executed in each IPC as provided in paragraph (i) of Sub-Clause GCC 14.3, starting from 1st IPC against work done provided

		that the advance payment shall be completely repaid prior to the time when 90% of the Accepted Contract Amount less Provisional Sums has been certified for payment. It may be more than 15% in the last instalment to ensure full repayment.
27.	14.3	Period of payment: one month
28.	14.3(b)	Number of additional paper copies of statements: four (04)
29.	14.3(iii)	Percentage of retention: 7% (seven percent) Limit of Retention Money: 5% (five percent)
30.	14.5(b)(i)	Plant and Materials for payment when shipped: Plant and Materials under Bill of "Imported Plant and Materials" shall be paid as per payment conditions mentioned in Sub-Clause 14.3 (xi)
31.	14.5(c)(i)	Plant and Non-Perishable Materials under Bill of "Imported Plant and Materials" shall be paid as per payment conditions mentioned in Sub-Clause 14.3 (xi)
32.	14.6.2	Withholding (amount in) an IPC: 10% of the Accepted Contract Amount.
33.	14.7(a)	Period of payment of Advance Payment to the Contractor: 14 days
34.	14.7 b(i)	Period for the Procuring agency/Employer to make interim payments to the Contractor under Sub-Clause 14.6 (interim Payment): 14 days
35.	14.7 b(ii)	Period for the Procuring agency/Employer to make interim payments to the Contractor under Sub-Clause 14.13 (Final Payment): 28 days
36.	14.7(c)	Period for the Procuring agency/Employer to make final payment to the Contractor: 56 days
37.	14.8	financing charges for delayed payment: Nil
38.	14.11.1(b)	Number of additional paper copies of draft Final Statement: four (4)
39.	14.15	Currencies of Payment The Contract Price shall be paid in Pakistani Rupees (PKR).
40.	14.15 (a)(i)	Local Currency: 100% Foreign Currency: 0%

41.	14.15 (c)	Local Currency: 100% Foreign Currency: 0%
42.	14.15 (f)	Rate of exchange: As stated in Appendix-C.
43.	17.2 (d)	Liability for Care of the Works Nil
Insurance (GCC Clause 19)		
44.	19.1	Permitted deductible limits insurance required for the Works: 10% of the loss amount on each and every loss. insurance required for Goods: Nil insurance required for liability for breach of professional duty: Nil insurance required against liability for fitness for purpose (if any is required): Nil insurance required for injury to persons and damage to property: Pak Rupees one hundred thousand (PKR. 100,000) per occurrence with number of occurrences unlimited insurance required for injury to employees: Pak Rupees one hundred thousand (Rs. 100,000) per occurrence with number of occurrences unlimited other insurances required by Laws and by local practice: Nil
45.	19.1	Periods for submission of insurance: a) evidence of insurance: Not later than the Commencement Date b) relevant policies: Within twenty-eight (28) days from the Commencement Date
46.	19.2.1(b)	Additional amount to be insured: 15% of Accepted Contract Amount
47.	19.2.1(iv)	List of Exceptional Risks which shall not be excluded from the insurance cover for the Works: Nil
48.	19.2.2	Extent of insurance required for Goods: from Ex-Works to delivery at the Site Amount of insurance required for Goods: Full Replacement Value
49.	19.2.3(a)	amount of insurance required for liability for breach of professional duty: full replacement value of the Works to be designed by the Contractor

50.	19.2.3(b)	Insurance required against liability for fitness for purpose: Yes
51.	19.2.3	Period of insurance required for liability for breach of professional duty: Until the date of issuance of Performance Certificate
52.	19.2.4	Amount of insurance required for injury to persons and damage to property: Injury to person and Fata case: in accordance with Workmen Compensation Act Damage to Property: PKR 1 million without limit to the number of incidents
53.	19.2.6	Insurance Other insurances required by Laws and by local practice: All insurances as applicable to the extent of execution of the project, under Federal and Provincial laws of Islamic Republic of Pakistan.
Dispute Avoidance/ Adjudication Board (GCC Clause 21)		
54.	21.1	As and when required (Ad-hoc DAB)
55.	21.1	The DAB shall comprise: *sole member*
56.	21.1	List of proposed members of DAB [to be inserted at the time of signing of the Contract] - Proposed by Employer/ Procuring agency/Employer: One sole member to be appointed with mutual consent of both parties. - Proposed by Contractor: One sole member to be appointed with mutual consent of both parties.
57.	21.2	Appointing entity (official) for DAB members: Chairman Pakistan Engineering Council (PEC) from the list of PEC approved arbitrators published at its website.
58.	21.6	PEC Rules of Conciliation and Arbitration or Pakistan Arbitration Act of 1940, if the former is inactive. The place of Arbitration shall be in the Employer's country: Islamabad, Pakistan

PUBLIC PROCUREMENT REGULATORY AUTHORITY
(PPRA)
EPADS

Part-B Special Provisions

PARTICULAR CONDITIONS

Part B - Special Provisions

1.1 Definitions

1.1.22 "DAAB or Dispute Avoidance / Adjudication Board"

Delete the text of 1.1.22 and replace with the following:

"**Dispute Adjudication Board**" or "**DAB**" means the person so named in the Contract, or appointed under Clause 21"

1.1.23 "DAAB Agreement"

Delete the text of 1.1.23 and replace with the following:

"**DAB Agreement"** means the Agreement signed or deemed to have been signed by both parties and the sole member of the DAB in accordance with Sub-Clause 21.1. [*Constitution of DAB*] or Sub-Clause 21.2 [*Failure to Appoint DAB Member(s)*], incorporating by reference the General Conditions of DAB Agreement contained in the Appendix of these General Conditions with such amendments as are agreed.

1.1.76 "Specification"

Following is added at the end:

"and consists of two parts i.e.,

i) "Part A - Specific Provisions"; and
ii) "Part B - Technical Provisions":
- Technical Specification.

1.2 Interpretation

"and" is deleted from the end of sub-paragraph (i) and added at the end of sub-paragraph (j).

Sub-paragraph (k) is added:

"(k) The word "tender" is synonymous with "bid" the word tenderer with "bidder", the words "tender documents" with "bidding documents" and "Schedule of Prices" with "Bill of Quantities", as applicable."

1.5 Priority of Documents

The documents listed at (a) through (k) of this Sub-Clause are deleted and substituted with the following:

(a) the Contract Agreement;
(b) the Letter of Acceptance;
(c) The completed Letters of Technical & Price Bid;
(d) the Particular Conditions Part A - Contract Data;
(e) the Particular Conditions Part B - Special Provisions;

(f) the General Conditions;

(g) the Specification Part A - Specific Provisions;

(h) The Specification Part B - Technical Provisions.

(i) Bill of Quantities.

(j) Drawings

(k) any other documents forming part of the Contract.

The addenda/ corrigenda, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

1.6 Contract Agreement

Delete the text and substitute with the following:

The Parties shall sign a Contract Agreement within 28 days after the Contractor receives the Letter of Acceptance. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Contractor. The Contractor shall prepare six (6) copies of the Contract Document (including all the volumes / documents listed in the Contract Agreement) along-with copies of all the bonds/Guarantees/Sureties, at his cost and shall submit the same to the Employer".

3.1 The Engineer

In sub-paragraph (a) the text "as defined in the Pakistan Engineering Council Act, 1975 (Act No. V of 1976)" are added after the words "professional engineer"

3.2 Engineer's Duties and Authority

The Engineer shall obtain the consent in writing of the Employer before taking action under the following Sub-Clauses of these Conditions:

(a) Consenting to the subcontracting of any part of the Works under Sub-Clause 5.1 [*Subcontractors*]

(b) Any action under Sub-Clauses 8.9 [*Employer's Suspension*] and 8.12 [*Prolonged Suspension*]

(c) Issuance of "Taking Over Certificate" under Sub-Clause 10.1 [*Taking Over the Works and Sections*].

(d) Issuing the "Performance Certificate" under Sub-Clause 11.9 [*Performance Certificate*].

(e) Sub-Clause 13.1 [*Right to Vary*]: instructing a Variation, except;

(i) in an emergency situation as determined by the Engineer, or

(ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Contract Data.

(f) Sub-Clause 13.3 [*Variation Procedure*]: approving a proposal for Variation submitted by the Contractor in accordance with Sub-Clause 13.3.2 [Variation by Request for Proposal] or 13.2 [*Value Engineering*].

(g) Certifying release of second half of the Retention Money under Sub-Clause 14.9 [*Release of Retention Money*].

(h) Issuing Final Payment Certificate under Sub-Clause 14.13 [*Issue of FPC*].

(i) Any Change in the ratio of Contract currency proportions and payment thereof under Clause 13.6 [*Adjustment for Changes in Law*].

(j) Extra payment as a result of Contractor's claims under Clause 20 [*Employer's and Contractor's Claim*].

Any such requirement shall not be applied to any action by the Engineer under Sub-Clause 3.7 [*Agreement or Determination*], as stated in Sub-Clause 3.2 [*Engineer's Duties and Authority*] of the General Conditions.

Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer.

Following is added after the words "the Employer's consent is required" in 4th paragraph:

"stating that the Employer's consent has been obtained for that specified authority".

4.2 Performance Security

4.2.1 Contractor's Obligations

The entity issuing the Performance Security and its form shall be as under:

The Performance Security shall be, at the option of the Contractor, issued in the prescribed form included in the Bidding Documents, by (a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan.

Following paragraph is added at the end of this Sub-Clause:

"The amount of Performance Security shall be reduced to 50% following issue of the Taking-Over Certificate for the whole of the Works under Clause 10 of Conditions of Contract."

The cost of complying with requirements of this Sub-Clause shall be borne by the Contractor.

4.3 Contractor's Representative

In second paragraph the text "professional engineer as defined in the Pakistan Engineering Council Act, 1975 (Act No. V of 1976) (having temporary licence in case of foreign engineer under Section 12 of the Pakistan Engineering Council Act, 1975 (Act No. V of 1976)" are added after the words "qualified, experienced".

In the 3rd paragraph the words "28 days" are substituted by "14 days". In 2nd line of 4th paragraph the text "or appoint a replacement" is substituted by "except appointment of a suitable temporary replacement is deployed at the Site"

4.4 Contractor's Documents

4.4.2 As-Built Records

First paragraph is deleted and the text in the last paragraph is substituted with the following:

"The Contractor shall furnish to the Engineer 6 copies, one reproducible and one electronic copy (provided the Engineer has made available to the Contractor editable form of the Drawings) of all Drawings amended to conform to the Works as built. In case the Engineer does not make available to the Contractor editable form of the Drawings, the Contractor shall furnish to the Engineer as-built data for incorporation in the Drawings. Upon receipt of PDF versions of the as-built drawings prepared by the Engineer, the Contractor shall furnish to the Engineer 6 copies and one reproducible of these Drawings.

The price of such Drawings shall be deemed to be included in the Contract Price."

Following Sub-Clause is added:

4.4.4 Shop Drawings

The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

Review and approval by the Engineer shall not exceed 21 days and be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and the Engineer's review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.

4.8 Health and Safety Obligations

The following text is added at the end of this Sub-Clause:

In the event of work being carried out outside the normal working hours and in the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works

where the night work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer.

4.20 Progress Reports

At the end of sub-paragraph (g) the word "and" is deleted and at the end of sub-paragraph (h) the full stop (.) is replaced with ";", and the following new sub-paragraphs are added as:

i) planned programme for the execution of the Works for next 56 days to enable the Engineer to determine its programme of inspection and testing;
j) monthly summary of daily job record indicating weather conditions, deployment of Contractor's Equipment, labour employment, local material procurement and material import, if any; and
k) salient contractual and project information

5.1 Subcontractors

Add the following text at the end of paragraph (ii):

"under Schedule to Bid"

The following is added at the end of the last paragraph of Sub-Clause 5.1:

"All subcontracts relating to the Works shall include provisions which entitle the Employer to require the subcontract to be assigned to the Employer under sub-paragraph (a) of Sub- Clause 15.2.3 [*After Termination*].

The Contractor shall give reasonable opportunity to contractors from Islamic Republic of Pakistan for subcontracts for the Works, and endeavour to employ such contractors as Subcontractors."

5.2 Nominated Subcontractors

5.2.2 Objection to Nomination

In sub-paragraph (c), "and" is deleted from the end of (i); "." at the end of (ii) is replaced with: ", and".

The following is then added as (iii):

"(iii) be paid only if and when the Contractor has received from the Employer payments for sums due under the Subcontract referred to under Sub-Clause 5.2.3 [*Payment to nominated Subcontractors*]."

6.1 Engagement of Staff and Labour

The following paragraph is added at the end of the Sub-Clause:

"The Contractor shall, to the extent practicable and reasonable, employ staff (not less than 50%) and labour (not less than 85%) with appropriate qualifications and experience from sources within the Islamic Republic of Pakistan."

6.7 Health and Safety of Personnel

The existing text is substituted with the following:

"In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose. The Contractor shall also provide all other medical services and appoint a health and safety officer at Site if stated in the Specifications. In case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means."

6.8 Contractor's Superintendence

Insert at the end of sub-paragraph (a) of this Sub-Clause:

"or, if not, the Contractor shall make competent interpreters available during all working hours, in a number sufficient for those persons to properly perform their superintendence duties"

The following text is added at the end of this Sub-Clause:

"The Contractor's authorized representative and his other engineers working at site shall possess valid registration with the Pakistan Engineering Council.

The Contractor's authorized representative at Site shall be authorized to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract."

6.12 Key Personnel

The following is inserted at the end of the last paragraph:

"If any of the Key Personnel are not fluent in this language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer."

The following Sub-Clauses 6.13 to 6.26 are added at the end of Sub-Clause 6.12:

6.13 Foreign Personnel

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use all reasonable endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.

The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their

domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

6.14 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.

6.15 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.

6.16 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

6.17 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor's Personnel

6.18 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

6.19 Festivals and Religious Customs

The Contractor shall respect the Country's recognized festivals, days of rest and religious or other customs.

6.20 Funeral Arrangements

The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of its local employees who may die while engaged upon the Works.

6.21 Forced Labour

The Contractor, including its Subcontractors, shall not employ or engage forced labour which 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 labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

6.22 Child Labour

The Contractor, including its Subcontractors, shall not employ or engage child labour in accordance with relevant law(s) in force in Islamic Republic of Pakistan.

6.23 Employment

The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the

	Records of Workers	names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [*Contractor's Records*].
6.24	**Workers' Organizations**	The Contractor shall comply with the relevant labour laws of Pakistan which recognize workers' rights to form and to join workers' organizations/Trade Union of their choosing and to bargain collectively without interference.
6.25	**Non-Discrimination and Equal Opportunity**	The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure nondiscrimination and equal opportunity, including for specific groups such as women, persons with disabilities, migrant workers and children (of working age in accordance with Sub-Clause 6.22)
6.26	**Epidemics**	In the event of any out-break of illness of epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of overcoming the same.
7.7	**Ownership of Plant and Materials**	The following is added before the first paragraph: "Except as otherwise provided in the Contract," The following is added at the end of the Sub-Clause: "No Plant and/or Materials that is the property of the Employer shall be removed from the Site. If it becomes necessary to: (i) remove any item of such Plant from the Site for the purposes of repair, the Contractor shall give a Notice, with reasons, to the Engineer requesting consent to remove the defective or damaged item off the Site. This Notice shall clearly identify the item of defective or damaged Plant, and shall give details of: the defect or damage to be repaired; the place to which

defective or damaged item of Plant is to be taken for repair; the transportation to be used (and insurance cover for such transportation); the proposed inspections and testing off the Site; and the planned duration required before the repaired item of Plant shall be returned to the Site. The Contractor shall also provide any further details that the Employer may reasonably require; or

(ii) replace any item(s) of such Plant and/or Materials, the Contractor shall give a Notice, with reasons, to the Engineer clearly identifying the item(s) of Plant and/or Materials to be replaced, and giving details of the due date of delivery to the Site of the replacement item(s).

Where any item of Plant and/or Materials has become the property of the Employer under this Sub-Clause before it has been delivered to the Site, the Contractor shall ensure that such an item is not moved except for its delivery to the Site.

The Contractor shall indemnify and hold the Employer harmless against and from the consequences of any defect in title or encumbrance or charge (except any reasonable restriction arising from the intellectual property rights of the manufacturer or producer) on any item of Plant and/or Materials that has become the property of the Employer under this Sub-Clause."

The following Sub-Clause 7.9 is added after Sub Clause 7.8:

7.9	**Use of Pakistani Materials and Services**	The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.
8.1	**Commencement of Works**	The following is added before the first paragraph: "After signing of the Contract Agreement by both Parties," and thereafter the word "The" is replaced with the word "the".
8.5	**Extension of Time for Completion**	The following is added after paragraph (c): "for last five years".

The following Sub-Clause 11.12 is added after Sub-Clause 11.11:

11.12	**Supervisory**	If provided under the Schedule of Prices, the Contractor shall provide supervisory assistance to the Employer during the DNP

	Assistance During DNP	for the Works. Such supervisory assistance shall be as described in the Specification for the purpose of supporting the Employer's operation and maintenance of the Plant for the period specified in the Schedule of Prices after the Date of Completion.
12.2	**Method of Measurement**	The following paragraph is added at the end of the Sub-Clause: "Summary of measured quantity for payment shall be delineated item-wise under four heads namely; "Schedule of Prices Quantity", "Quantity Executed To-date", "Quantity Certified Previously" and "Net Quantity Executed under this Certificate".
12.3	**Valuation of the Works**	After sub-paragraph (c) Delete the text of 5th paragraph "Each new rate…… …..relevant matters" and substitute with the following: " the valuation will be carried out by the Engineer on the basis of similar items covered in the Bill of Quantities, insofar as such rates or prices apply and where such rates or prices do not directly apply, the value shall be based on the rates or prices deduced therefrom so far as it is practicable to do so. If the same is not provided in the Bill of Quantities then the valuation will be carried out on the basis of actual with the application of current market rates for labour, material etc. The percentage of overheads, profit & taxes, etc. to be allowed in such cases shall be twenty five percent (25%)."
13.4	**Provisional Sums**	The following paragraph is inserted as the penultimate paragraph: "The Provisional Sum shall be used to cover the Employer's share of the DAB members' fees and expenses, in accordance with Clause 21. No prior instruction of the Engineer shall be required with respect to the work of the DAB. The Contractor shall submit the DAB members' invoices and the satisfactory evidence of having paid 100% of such invoices as part of the substantiation of those Statements submitted under Sub-Clause 14.3."
13.6	**Adjustments for Changes in Laws**	The following paragraphs are added at the end of the Sub-Clause: "Notwithstanding the foregoing, the Contractor shall not be entitled to an extension of time if the relevant delay has already been taken into account in the determination of a previous extension of time and such Cost shall not be separately paid ifthe same shall already have been taken into account in the indexing of any inputs to the Table of Adjustment Data in accordance with the provisions of Sub-Clause 13.7 [*Adjustments for Changes in Cost*]."

14.2 Advance Payment

14.2.1 Advance Payment Guarantee

The entity issuing the Advance Payment Guarantee and its form shall be as under:

The Advance Payment Guarantee shall be in the form of Guarantee issued by (a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan.

14.2.2 Advance Payment Certificate

Add the following at the end:

"The Engineer shall issue an Advance Payment Certificate for the advance payment in following two equal parts:

(i) first part within 14 days after signing of the Agreement or the date of receipt of Engineer's Notice to Commence, whichever is earlier; and

(ii) second part within 42 days from the date of payment of the first part, subject to the satisfaction of the Engineer as to the state of mobilization of the Contractor, bringing/installing/erecting of essential equipment and mobilization of minimum mandatory staff requirement as per Section-V to complete the requirement for the entire work, having fulfilled his obligation under the Contract agreement for provision of facilities for the Engineer such as Site office, transport etc. and his own facilities such as contractor's camp, storage yards, etc. and having completed at least 2% of the permanent works (to be assessed by the Engineer during this time period."

14.3 Application for interim Payment

After serial No. 'x' the following is added:

(xi) the payment for imported items quoted in local currency shall be made as follows:

For imported equipment and materials (to be imported for the permanent works), the payment conditions shall be as under:

a) Thirty-five percent (35%) of the quoted rates of imported items in BOQ shall be paid after approval of technical submittals of Imported Plant by the Engineer or Engineer's Representative and upon submission of Letter of Credit (L/C) (in original) established by the Contractor for payment to the Manufacturer. The charges for the establishment of such (i.e. opening and retirement) L/C and subsequent charges for modifications and extension shall be borne by the Contractor.

b) Thirty percent (30%) of the quoted rates of imported items in BOQ shall be paid upon submission of the following documents:

   i. Shipping Documents comprising:

      a. Payment/Commercial Invoice duly certified by the Engineer or Engineer's Representative;

      b. Clean on-board Bill of Landing or airway Bill issued by freight forwarder;

      c. Certificate or Policy of Marine Insurance covering transit insurance from Ex-works to the Project Site of the portion of the Plant for which Certificate of Payment is requested; and

      d. Packing List.

   ii. Certificate of Origin (in original), issued by the Manufacturer.

   iii. Any other document as necessary due to statutory requirement.

c) Fifteen percent (15%) of the quoted rates of imported items in BOQ shall be paid on arrival at delivery at Site and upon issuance of Inspection Certificate at Site by the Engineer or Engineer's Representative upto his satisfaction.

d) Fifteen percent (15%) of the quoted rates of imported items in BOQ shall be paid on Completion of Installation, Balancing, Testing and Commissioning of complete System upto the satisfaction of the Engineer or Engineer's Representative and after issuance of Taking Over Certificate (TOC) and certified Invoice by the Engineer or Engineer's representative.

e) Five percent (5%) of the quoted rates of imported items in BOQ shall be paid upon:

   i. On successful performance of one summer and one winter reliability trial test during Defects Notification Period up to the satisfaction of the Engineer or Engineer's Representative and Submission of invoice for the same amount duly certified by the Engineer or Engineer's Representative.

All above payments shall be made after, deduction of all applicable taxes, Advance Payment and Retention Money.

(xii). Payment against Local Plant and Imported Plant procured from local market

Payment to the Contractor against Local Plant and Imported Plant procured from local market shall be made in the following manner:

a) Sixty (60%) of the quoted rates of imported items in BOQ shall be paid on pro-rata basis upon delivery at Site, submission of invoice and after issuance of Inspection Certificate by the Engineer or Engineer's Representative following inspection of such Plant upto his satisfaction.

b) Twenty five percent (25%) of the quoted rates of imported items in BOQ shall be paid on completion of installation upto the satisfaction of the Engineer or Engineer's Representative and submission of invoice duly certified by the Engineer or Engineer's Representative.

c) Ten percent (10%) of the quoted rates of imported items in BOQ shall be paid on completion of testing and commissioning upto the satisfaction of the Engineer or Engineer's Representative and after issuance of Substantial Completion Certificate and submission of invoice duly certified by the Engineer or Engineer's Representative.

d) Five percent (5%) of the quoted rates of imported items in BOQ shall be paid upon:

i. On successful performance of one summer and one winter reliability trial test during Defects Notification Period up to the satisfaction of the Engineer or Engineer's Representative and Submission of invoice for the same amount duly certified by the Engineer or Engineer's Representative.

All above payments shall be made after deduction of all applicable taxes, Advance Payment and Retention Money.

Payment for operation & maintenance shall be made on monthly basis after issuance of TOC by the Engineer.

14.5 Plants and Material Intended for work

In the sixth & seventh line of the last paragraph, the text "The sum to be certified ……..or determined amount" is substituted by the following:

"shall be paid as per payment conditions mentioned in Sub-Clause 14.3 (xi) & (xii) herein above".

14.6 Issue of IPC

14.6.1 The IPC

In the first line of the 1st paragraph the words "28 days" are substituted by "14 days".

14.7 Payment

Delete '.' At the end of last paragraph and add the words "or through crossed cheque in favour of the Contractor."

14.8 Delayed Payment

In the first paragraph, third line, the words "compounded monthly" are deleted.

The text of 2nd paragraph is deleted and substituted with the following:

"The Employer shall pay to the Contractor compensation at the rate stated in the Contract Data."

15.2 Termination for Contractor' Default

15.2.1 Notice

Following text is added at the end of sub-paragraph (h) of this Sub-Clause:

"For the purposes of this Contract, corrupt and fraudulent practices have been defined in Public Procurement Rules 2026."

15.2.3 After Termination

The word "and" at the end of sub-paragraph (ii) of paragraph (b) is deleted. The following paragraph is added after sub-paragraph (iii):

"(iv) all Employer-Supplied Materials and/or Employer's Equipment made available to the Contractor in accordance with Sub-Clause 2.6 *[Employer-Supplied Materials and Employer's Equipment],* and"

15.4	**Payment after Termination for Contractor's Default**	The following text is added at the end of this Sub-Clause: "The Employer shall be entitled to sell any of the Contractor's Equipment, Temporary Works and unused materials and apply the proceeds of sale towards payment of any debt due from the Contractor to the Employer under this Clause including any outstanding payments to the Subcontractors."
16.2	**Termination by Contractor**	16.2.1 Notice The sub-paragraph (j) is deleted in its entirety. At the end of sub-paragraph (i) "; or" is replaced with "." and at the end of sub-paragraph (h) ";" is replaced with "; or". In sub-paragraph (f) "84 days" are replaced with "180 days" and text "for reasons not attributable to the Contractor" is added at the end.
16.3	**Contractor's Obligations After Termination**	Sub-paragraph (c) is deleted and replaced with: "(c) deliver to the Engineer all Employer-Supplied Materials and/or Employer's Equipment made available to the Contractor in accordance with Sub-Clause 2.6 *[Employer-Supplied Materials and Employer's Equipment];* and (d) remove all other Goods from the Site, except as necessary for safety, and leave the Site."
17.1	**Responsibility for Care of the Works**	After the two instances of "Goods" in the last paragraph, the words "Employer-Supplied Materials and/or Employer's Equipment" are added.

The following Sub-Clause 17.7 is added after Sub-Clause 17.6:

17.7	**Use of Employer's Accommodation/ Facilities**	The Contractor shall take full responsibility for the care of the items of the Employer's facilities and/or accommodation, if any, as detailed in the Specification, from the date of use and/or occupation by the Contractor until the date on which such use and/or occupation is re-vested in the Employer. If any loss or damage happens to any of the above items during a time while the Contractor is responsible for its care, arising from any cause other than a cause for which the Employer is responsible or liable, the Contractor shall promptly rectify the loss or damage at the Contractor's risk and cost.
18.1	**Exceptional Events**	The words "or disorder" are replaced with "disorder or sabotage" in sub-paragraph (c) of the Clause.
18.4	**Consequences of an Exceptional Event**	The following is added at the end of sub-paragraph (b) after deleting the ".": ", including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Exceptional Events, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 19.2 [*Insurance to be provided by the Contractor*]."

18.5	**Optional Termination**	In sub-paragraph (c), the words “and necessarily” are added after the words “was reasonably”.
19.1	**General Requirements**	Following text is added at the end of first paragraph: “The Contractor shall immediately after the date of the Letter of Acceptance submit the draft of insurance policies for the Employer’s consent.” Following text is added at the end of third paragraph: “The Contractor shall, within the respective periods stated in the Contract Data submit to the Engineer and the Employer a) evidence that the insurances described in this Clause have been effected, and b) copies of policies of the insurances described in Sub-Clauses 19.2.1, 19.2.4 and 19.2.5.”
19.2	**Insurance to be provided by the Contractor**	19.2.5 Injury to employees The words “sickness, disease” are deleted in the third line of first paragraph. The following Sub-Clause is added after Sub-Clause 19.2.6: 19.2.7 Insurance Company “The Contractor shall be obliged to place all insurances described in this Clause with insurers listed in the Contract Data with min. rating of AA by PACRA/VIS.

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21.1 Constitution of the DAAB

Delete the text of Sub-Clause 21.1 in its entirety and replace with the following:

Disputes shall be adjudicated by a DAB in accordance with Sub-Clause 21.4 [*Obtaining DAAB's Decision*]. The Parties shall jointly appoint a DAB by the date 28 days after a Party gives notice to the other Party of its intention to refer a dispute to a DAB in accordance with Sub-Clause 21.4.

The DAB shall comprise, as stated in the Contract Data, of one suitably qualified person ("the member"). The members shall be selected from those on the list on PEC Website, other than anyone who is unable or unwilling to accept appointment to the DAB.

The agreement between the Parties and the sole member ("adjudicator") shall incorporate by reference the General Conditions of Dispute Adjudication Agreement contained in the Appendix to FIDIC Conditions of Contract for Plant Design-Build, First Edition 1999, with such amendments as are agreed between them.

The terms of the remuneration of the sole member shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.

If at any time the Parties so agree, they may appoint a suitably qualified person to replace the member of the DAB. Unless the Parties agree otherwise, the appointment will come into effect if the member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment. The replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause.

The appointment of the member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the DAB (including the member) shall expire when the DAB has given its decision on the dispute referred to it under Sub- Clause 21.4 [*Obtaining DAAB's Decision*], unless other disputes have been referred to the DAB by that time under Sub-Clause 21.4, in which event the relevant date shall be when the DAB has also given decisions on those disputes.

21.3 Avoidance of Disputes

Delete the Sub-Clause 21.3 in its entirety.

21.4 Obtaining DAAB's Decision

In the 1st paragraph of Sub-Clause 21.4 after the words "if a dispute arises between the parties then, "add the following:

"after a DAB has been appointed";

Delete the words "(whether or not any informal discussions have been held under Sub-Clause 21.3 [*Avoidance of Disputes]*);.

.21.4.1" Reference of a Dispute to the DAAB"
Delete Sub-Paragraph (a) of Sub-Clause 21.4.1.

21.6 Arbitration

The word "international" is deleted in the sixth line of first paragraph. The text of sub-paragraph (a) is substituted with the following:
"the Dispute shall be finally settled under the Rules of Arbitration, specified in the Contract Data;"

The following Clauses are added after Clause 21

22 Custom Duty

The Contractor shall be liable to pay custom duty arising out of the Contract. The rates and prices as stated in the contract shall be deemed to cover all such duties.

23 Taxes

The Contractor, Subcontractors and their employees shall be liable to pay income tax, withholding tax, super tax and other taxes on income arising out of the Contract. The rates and prices as stated in the contract shall be deemed to cover all such taxes.

24 Integrity Part

If it is found and established at any stage that the Contractor or any of his Subcontractors, agents or servants have violated or involved in violation of the Integrity Pact signed by the Contractor then the Employer shall be entitled to:

a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agent or servants;

b) terminate the Contract; and

c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agent or servants.

The termination under sub-paragraph (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clause 15.1 to 15.4 and the payment under Sub-Clause 15.4 shall be made after having deducted the amounts due to the Employer under sub-paragraph (a) and (c) of this Sub-Clause

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ACADEMIC BLOCK

SZABMU, ISLAMABAD

HEATING VENTILATION & AIR CONDITIONING (HVAC) WORKS

TENDER DRAWINGS

(VOLUME - III)

September, 2026

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
NESPAK HOUSE, Sector-G, 5/2, P. O. Box 2461, Islamabad
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E-mail : islamabad@nespak.com.pk, nespak.isd@gmail.com

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LEGEND AND ABBREVIATIONS

SYMBOL	ABBV.	DESCRIPTION
20x12		RADIUS ELBOW WITH NO. OF SPLITTERS AS SHOWN
		DUCT TURNING UP (SUPPLY)
		DUCT TURNING DOWN (RETURN/EXHAUST)
		DUCT TURNING DOWN (SUPPLY)
		DUCT TURNING DOWN (RETURN/EXHAUST)
	VD	VOLUME DAMPER
	MVD	MOTORISED VOLUME DAMPER
	FD	FIRE DAMPER
	AL	ACOUSTIC LINING AS PER SHOWN IN CLEAR INSIDE DIMENSIONS
	FD	FIRE SMOKE DAMPER
FD		FLEXIBLE DUCT CONNECTION
		RECTANGULAR REDUCER IN THE DIRECTION OF FLOW
	TV	TURNING VANES
		SECTION THRU SUPPLY AIR DUCT
		SECTION THRU EXHAUST/RETURN AIR DUCT ARROW SIDE WRITTEN FIRST
		SECTION THRU FIRE
		SUPPLY AIR DIFFUSER
		EXHAUST GRILLE
		CONDENSATE DRAIN
		FILTER
		BY-PASS DAMPER IN AIR HANDLING UNIT
		REFER TO DETAIL OF DRAWING NO.3
		SECTION LINE, REFER DRAWING AS 4 OF DRAWING NO.3
24x18 (60) 1		SUPPLY AIR OUTLET 24"x18" INCH (600mm X 450mm) SIZE SCHEDULED AS LISTED IN EQUIPMENT SCHEDULE
40x12 (80) 1		RETURN AIR GRILLE 40"x12" INCH (1000mm X 300mm) SIZE SCHEDULED AS LISTED IN EQUIPMENT SCHEDULE
	ACP	APPARATUS CONTROL PANEL
	EF	EXHAUST FAN
	EF	EXHAUST FAN WITH BACK DRAFT DAMPER
	ST	SUPPLY FAN
3.0		DOOR OPENING AS SHOWN EQUATE FOOT
		UNDER CUT DOOR (25mm or 1 INCH)
	AHU	AIR HANDLING UNIT
	CU	CASSETTE TYPE INDOOR UNIT
	CU	CONDENSING UNIT - VRF
	ACU	AIR HANDLING CONDENSING UNIT
	WU	WALL MOUNTED INDOOR UNIT
	DU	DUCTED UNIT
	TFU	TREATED FRESH AIR UNIT
	HUM	HUMIDIFIER
	HT	HEATER
	EA	EXHAUST AIR
	SA	SUPPLY AIR
	RA	RETURN AIR
	OA	OUTDOOR AIR
	(TYP.)	QUANTITY OF TYPICAL CHARACTERISTICS
	WST	WATER SUPPLY PIPE

LIST OF DRAWINGS

SR. NO.	DRAWING NO.	REV NO.	TITLE	SCALE	REMARKS
01	4356/04/TD/1K01	A	HVAC - LEGEND, LIST OF DRAWINGS AND GENERAL NOTES	N.T.S	
02	4356/04/TD/1K02	A	HVAC - BASEMENT FLOOR PLAN	3/32"=1'-0"	
03	4356/04/TD/1K03	A	HVAC - GROUND FLOOR PLAN	3/32"=1'-0"	
04	4356/04/TD/1K04	A	HVAC - FIRST FLOOR PLAN	3/32"=1'-0"	
05	4356/04/TD/1K05	A	HVAC - SECOND FLOOR PLAN	3/32"=1'-0"	
06	4356/04/TD/1K06	A	HVAC - THIRD FLOOR PLAN	3/32"=1'-0"	
07	4356/04/TD/1K07	A	HVAC - FOURTH FLOOR PLAN	3/32"=1'-0"	
08	4356/04/TD/1K08	A	HVAC - FIFTH FLOOR PLAN	3/32"=1'-0"	
09	4356/04/TD/1K09	A	HVAC - ROOF PLAN	3/32"=1'-0"	
10	4356/04/TD/1K10	A	HVAC - ELECTRICAL DISTRIBUTION DIAGRAM	N.T.S	
11	4356/04/TD/1K11	A	HVAC - STANDARD DETAILS	N.T.S	
12	4356/04/TD/1K12	A	HVAC - CONTROL DIAGRAMS	N.T.S	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. HVAC CONTRACTOR SHALL ENSURE COORDINATION OF HVAC WORKS WITH ALL OTHER SERVICES DURING SHOP DRAWINGS STAGE.
3. READ THIS DRAWING IN CONJUNCTION WITH ALL RELEVANT PROJECT DRAWINGS.
4. FOR ELEVATIONS AND SECTIONS OF THE BUILDING REFER TO RELEVANT ARCHITECTURAL DRAWINGS.
5. FALSE CEILING/OPENING TO BE PROVIDED BY OTHERS TO CONCEAL HVAC DUCTS, PIPING, EQUIPMENT AND ACCESSORIES.
6. ACCESS PANELS SHALL BE PROVIDED BY OTHERS WHERE CONCEALED AT ALL LOCATIONS TO GAIN ACCESS TO EQUIPMENTS, DAMPERS AND VALVES. COORDINATE TO GIVE SIZES AND LOCATIONS.
7. ALL DRAIN PIPING FROM INDOOR AIR CONDITIONING EQUIPMENT (AHU, FCU, SPLIT UNITS ETC) SHALL BE TERMINATED TO NEAREST FLOOR DRAIN POINTS BY HVAC CONTRACTOR.
8. DUCTS, PIPES AND AIR VENTS/OUTLETS SHOULD BE INSTALLED AFTER COORDINATION WITH REFLECTED CEILING PLAN AND ELECTRICAL PLAN.
9. THE EXHAUST FANS SHOWN FOR THIRD FLOOR CAFETERIA KITCHEN ARE DRAWN FOR SPACE VENTILATION ONLY. FANS FOR KITCHEN SHALL BE PROVIDED AND INSTALLED BY THE OWNER.
10. THESE DRAWINGS ARE NOT FOR CONSTRUCTION.

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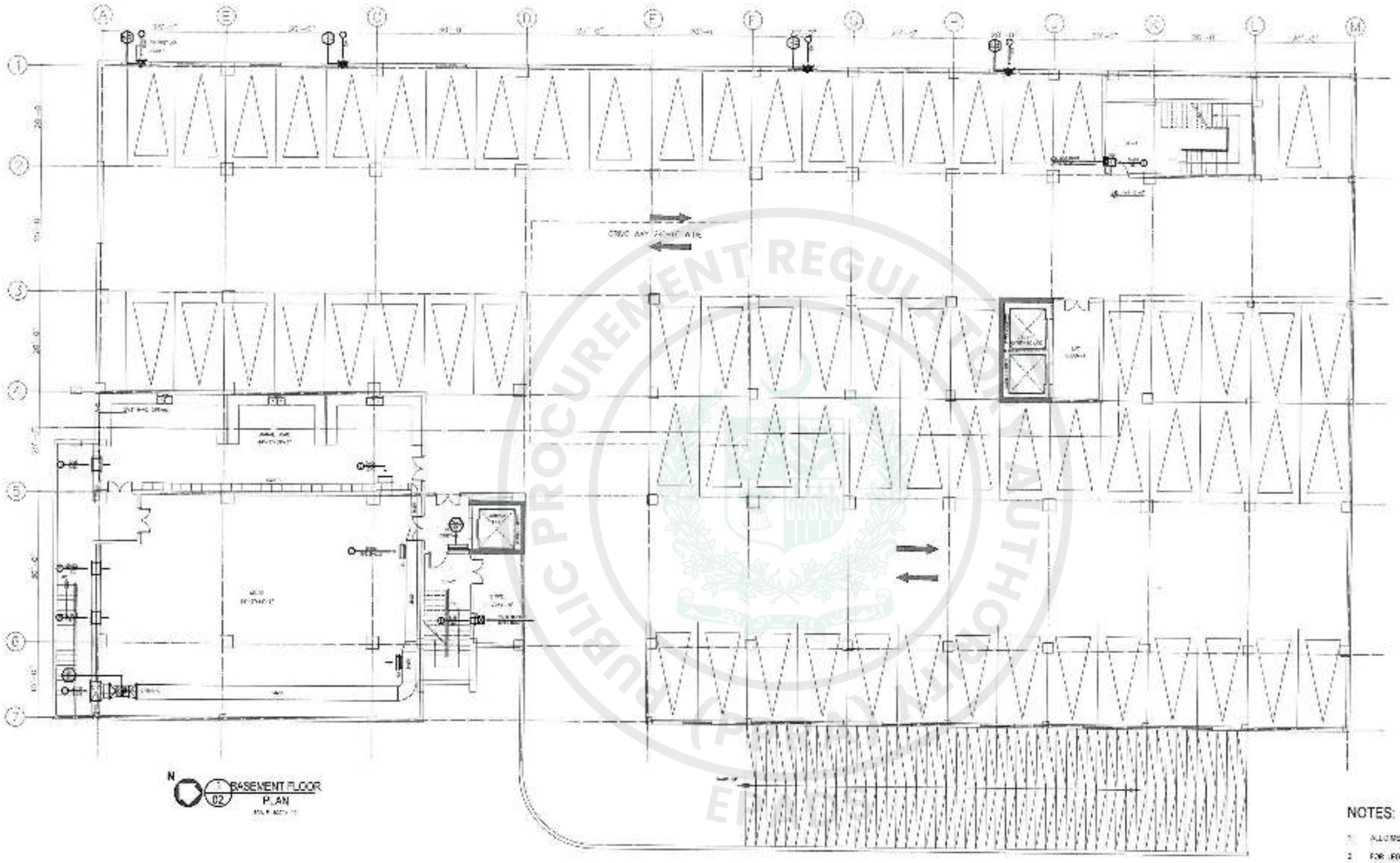
ACADEMIC BLOCK
SZABMU, ISLAMABAD
HVAC - GENERAL NOTES, LEGENDS & ABBREVIATIONS

NES PAK — NATIONAL ENGINEERING SERVICES PAK STAN (PVT.) LTD.

DESIGNED	REVIEWED	APPROVED

DATE: JUNE 2021 — DRAWING NO: 4356/04/TD/1K01 — REV: A

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS



N

02 BASEMENT FLOOR PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPTWHERE INDICATED.
2. FOR LEGEND, GENERAL NOTES AND SCHEDULES REFER DRAWING NO. M-00 ABBREVIATION

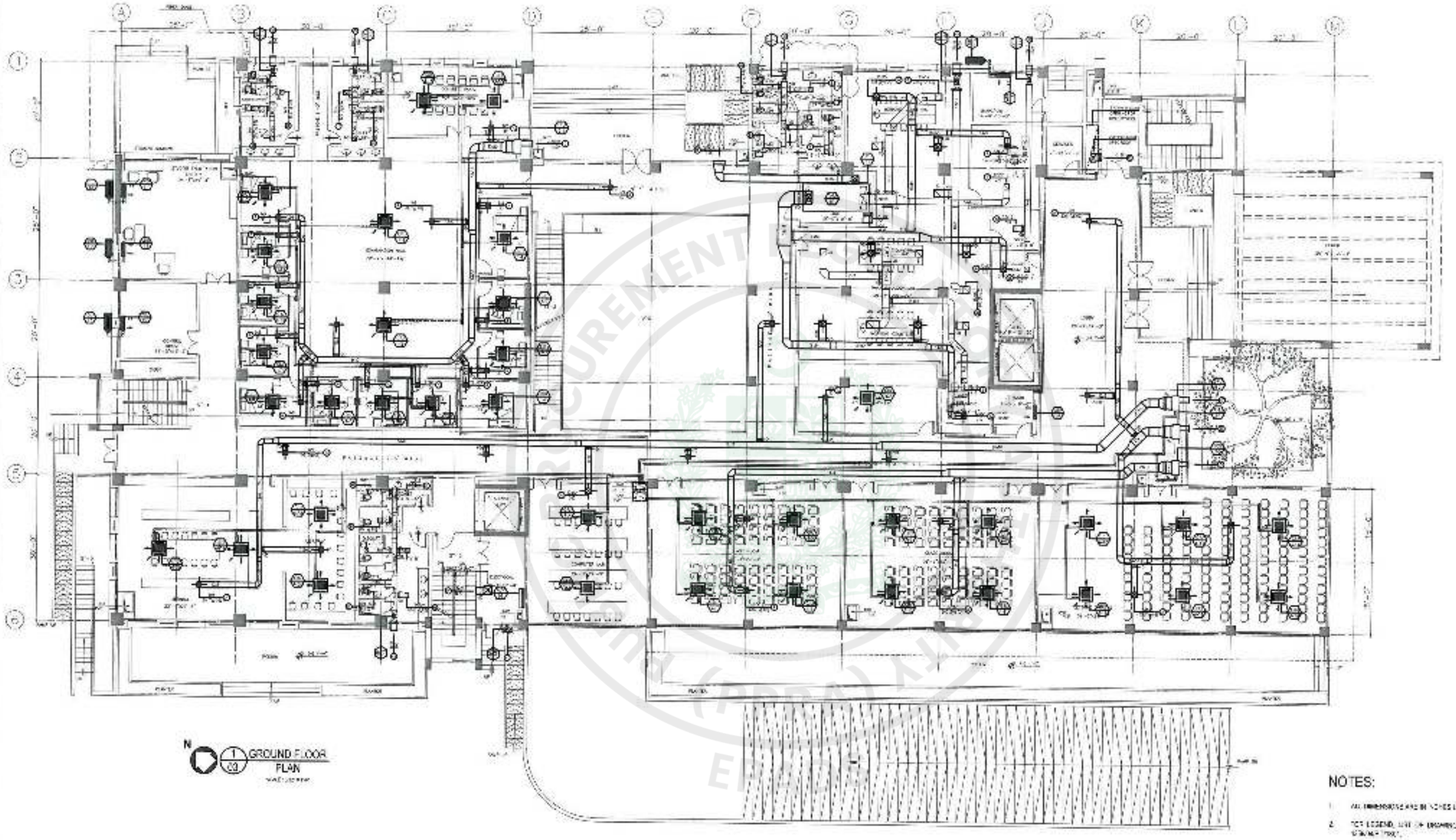
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ACADEMIC BLOCK
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HVAC - BASEMENT FLOOR PLAN

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N

1 GROUND FLOOR PLAN

NOTES:

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
2. FOR LEGEND, LIST OF ABBREVIATIONS AND GENERAL NOTES REFER DRAWING NO. H-001.

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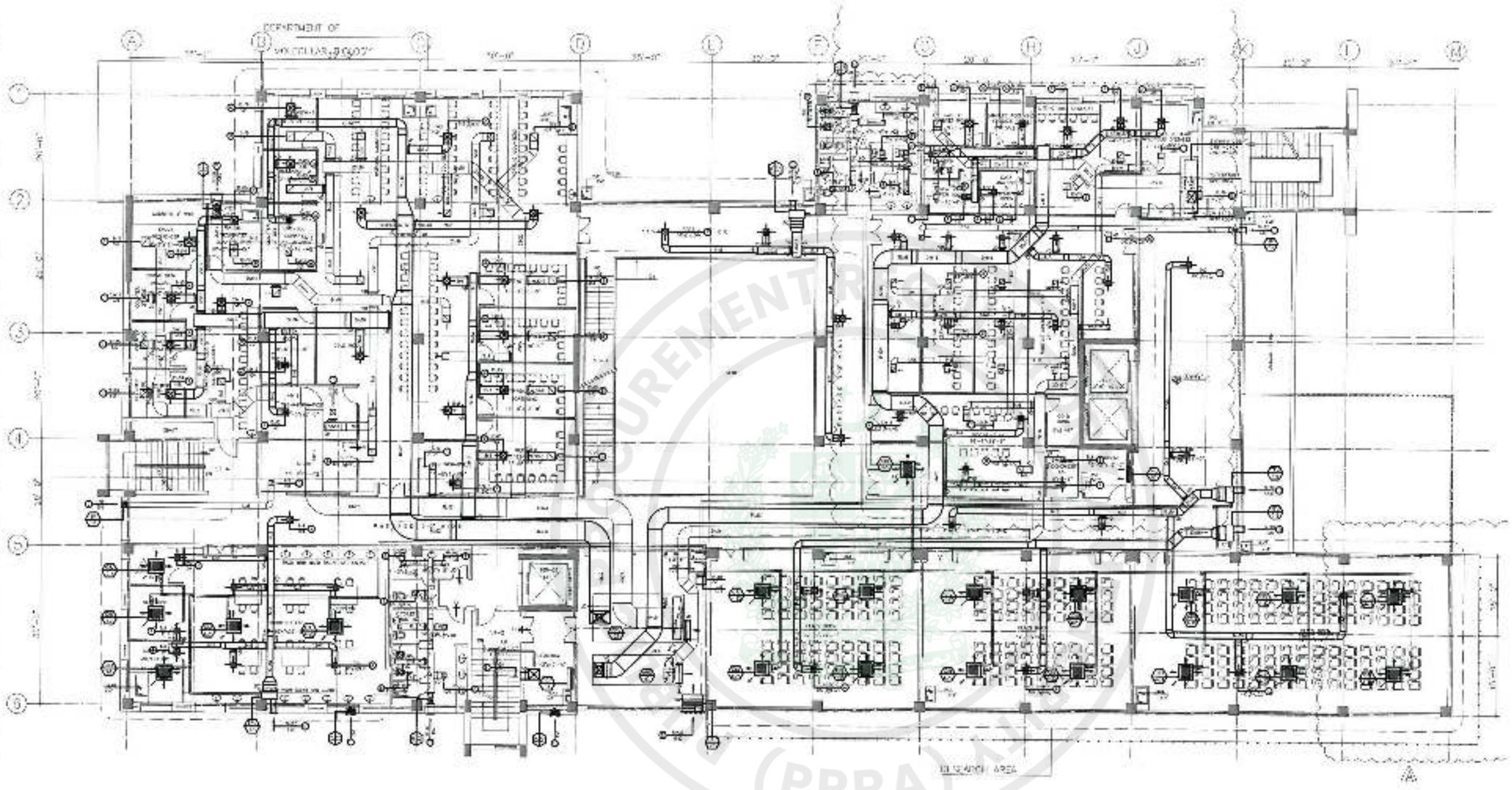
HVAC - GROUND FLOOR PLAN

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NO.	REVISION	BY	DATE

DRAWING NO. H-002

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N

1/34 FIRST FLOOR PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED
2. FOR LEGEND LIST OF DRAWINGS AND OTHERS, REFER TO DRAWING NO. [illegible]

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HVAC - FIRST FLOOR PLAN

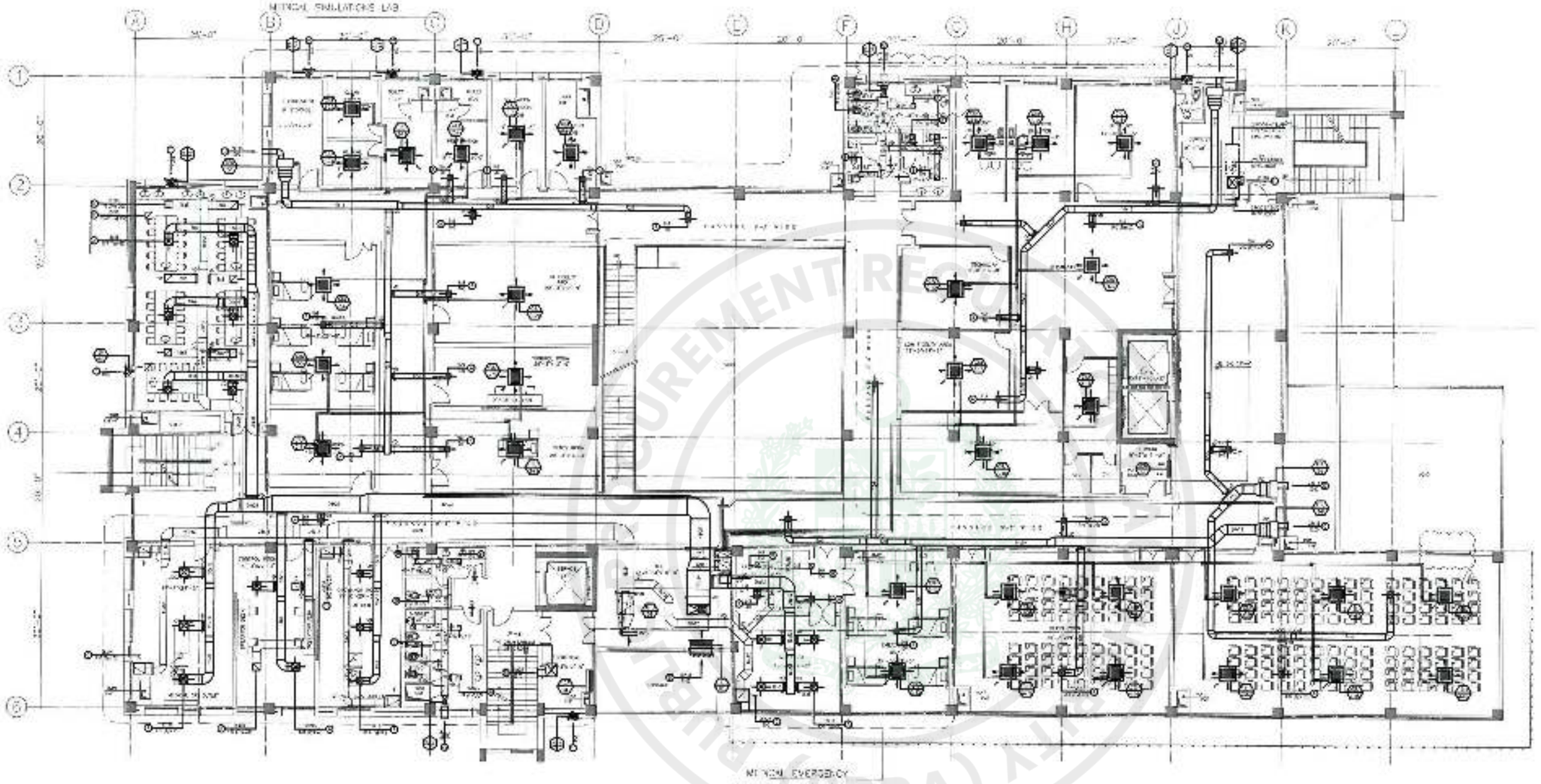
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DES'D | DRN | CHK | CO'D | VER'D

RECOMMENDED | APPROVED | APPROVED

DATE | DRAWING NO. | REV.

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N

SECOND FLOOR PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. FOR COMPLETE LIST OF DRAWINGS AND GENERAL NOTES REFER DRAWING NO. 4355-24-BOM1-001

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ACADEMIC BLOCK

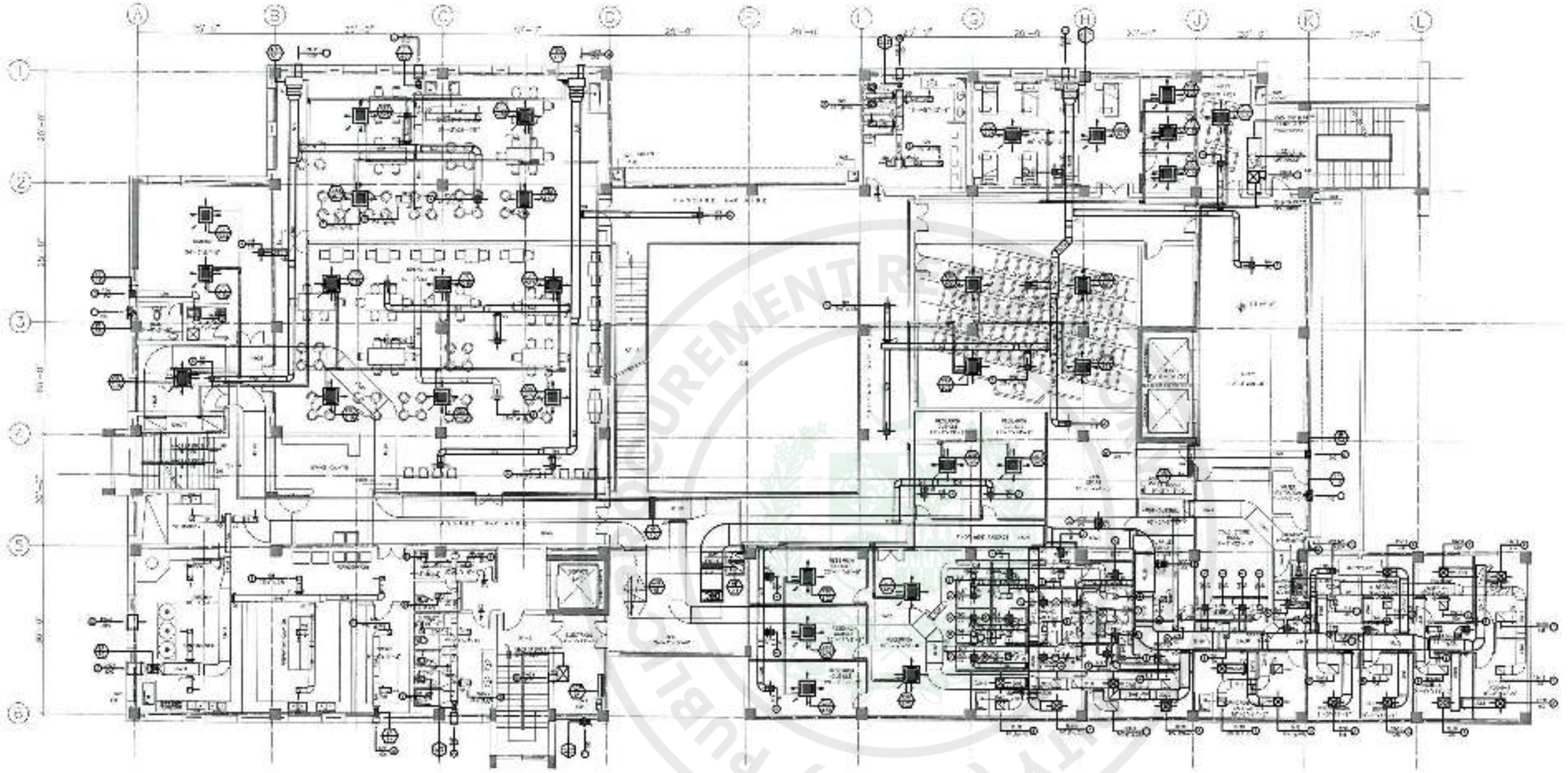
SZABMU, ISLAMABAD

HVAC - SECOND FLOOR PLAN

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DRAWING NO. 4355-24-BOM1-003

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THIRD FLOOR PLAN

NOTES:

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. FOR DETAILS, SEE OTHER DRAWINGS AND GENERAL NOTES FROM DRAWING NO. 4356/14/ED/1K01.

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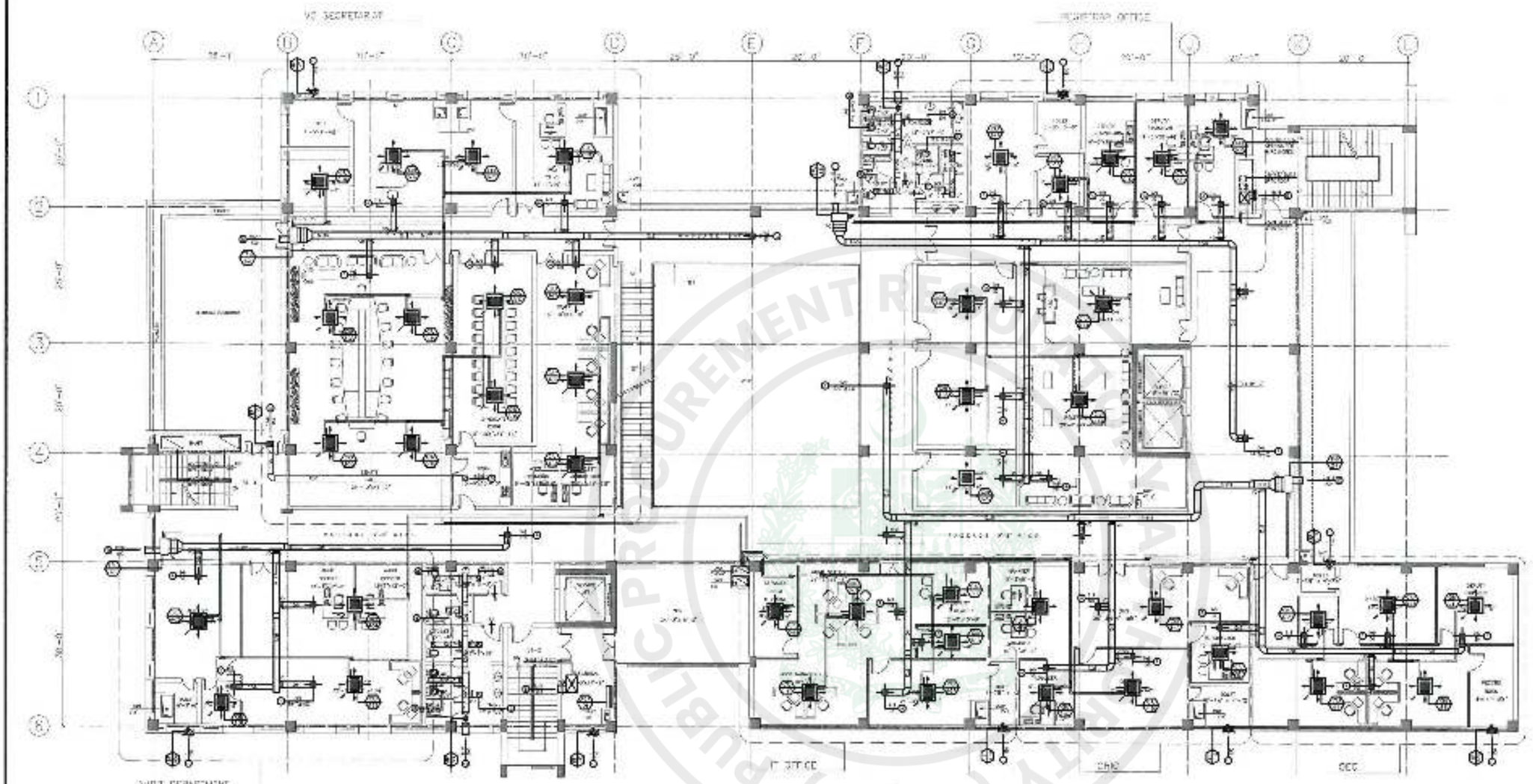
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HVAC - THIRD FLOOR PLAN

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FOURTH FLOOR PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED.
2. FOR DRAWING LIST OF ARCHITECTURAL AND GENERAL NOTES REFER DRAWING NO. A2650-ARD-1001

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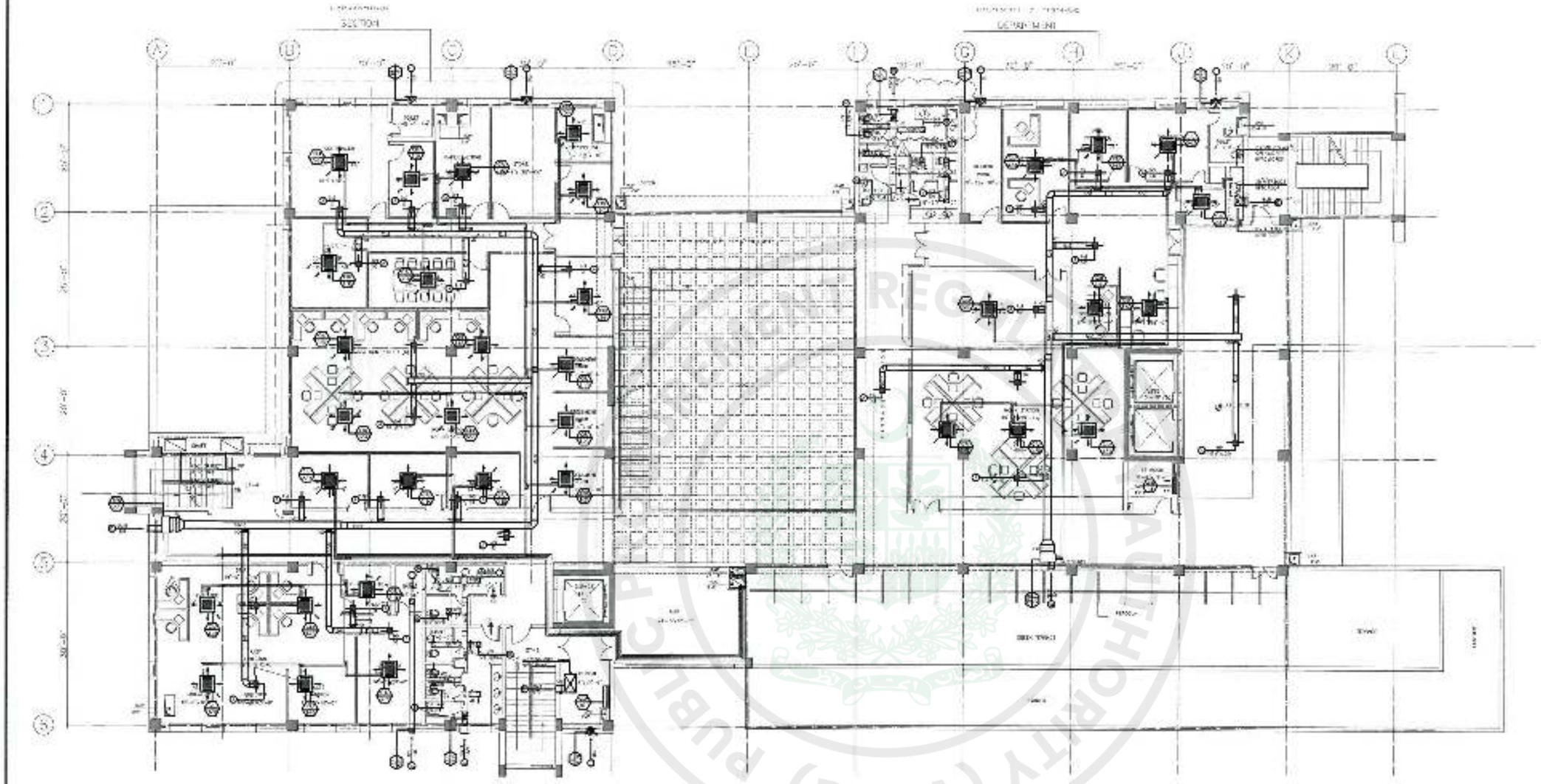
SZABMU, ISLAMABAD

HVAC - FOURTH FLOOR PLAN

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

DES'N	RECOMMENDED	REVIEW	APPROVED
DRN			
TRC			
CHD			
PROJ. MGR	DRAWING NO.		REV.
	A2650-ARD-1007		

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N

1/30 FIFTH FLOOR PLAN

NOTES:

1. ALL DIMENSIONS SHOWN IN MMS UNLESS OTHERWISE INDICATED.
2. FOR LEGEND, LIST OF DRAWINGS AND GENERAL NOTES REFER DRAWING NO. AR(PP)M(01)

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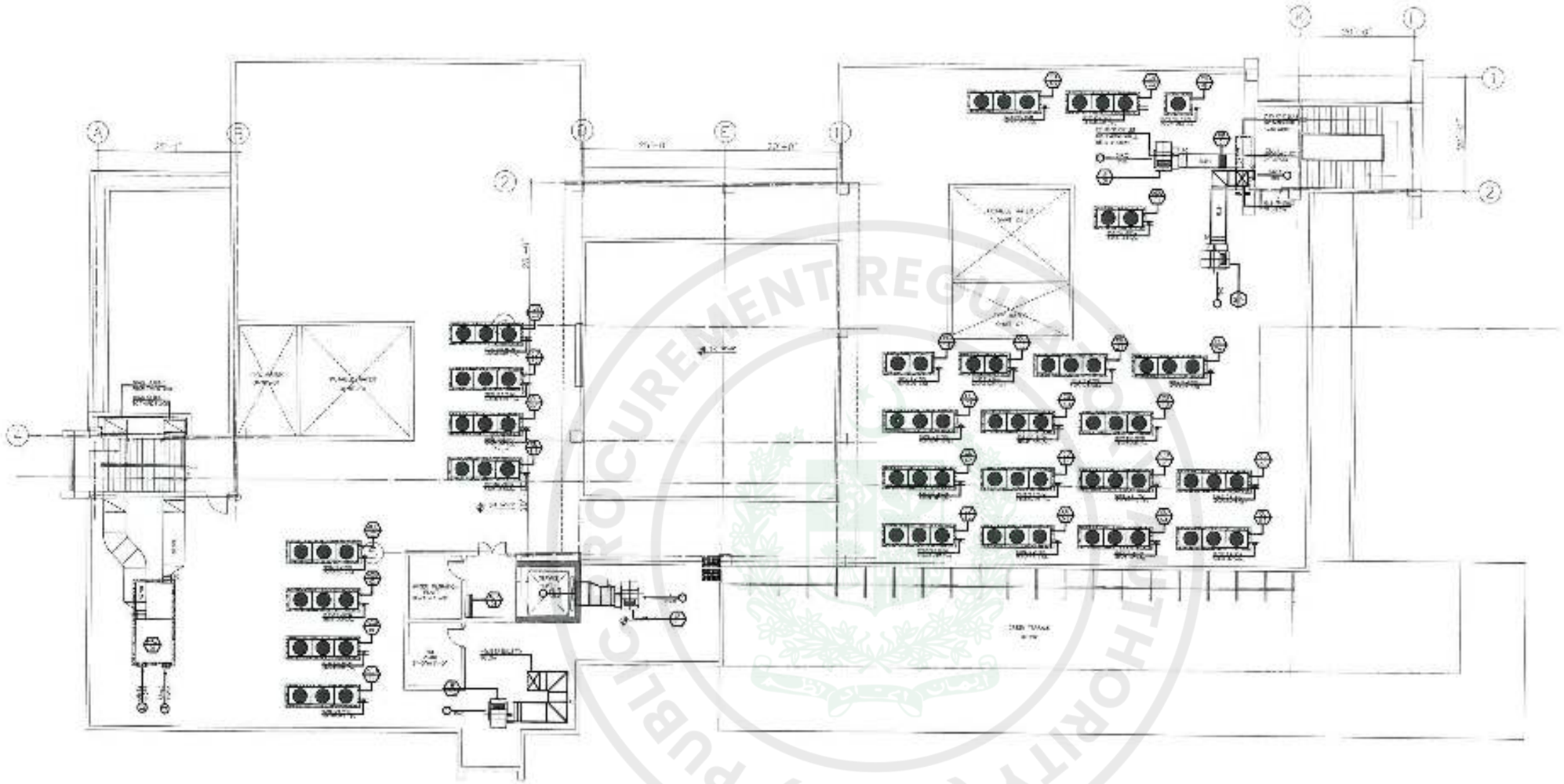
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HVAC - FIFTH FLOOR PLAN

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DSN.	CHKD.	TECHNICIAN	VERIFIED
DWN.	APPROVED		
REF.			
DATE		DRAWING NO.	REV.
SCALE		AR(PP)M(01)1K36	

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ROOF PLAN

NOTES:

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2. FOR FORMS LIST OF DRAWINGS AND GENERAL NOTES REFER DRAWING NO 4356/04/EDH/100.

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HVAC - ROOF PLAN

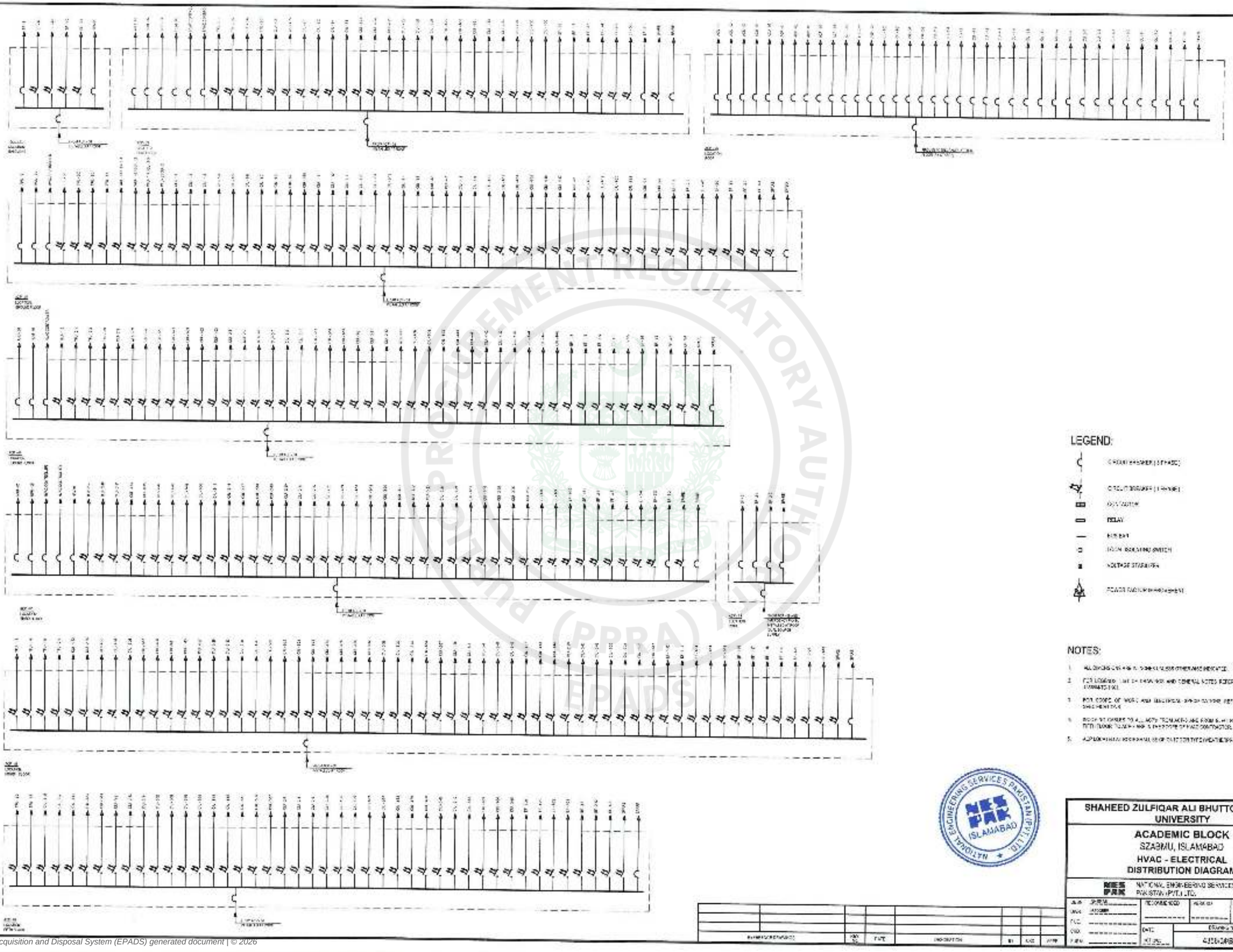
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DATE | DRAWING NO. | REV.

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LEGEND:

NOTES:

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED.
2. FOR LOCATION OF PANELS REFER DRAWING NO. [illegible]
3. FOR CODE OF WORK AND ELECTRICAL SPECIFICATIONS REFER TECHNICAL SPECIFICATIONS.
4. REFER TO DRAWING NO. [illegible] FOR SINGLE LINE DIAGRAM OF ELECTRICAL DISTRIBUTION.
5. ALL EQUIPMENT AND MATERIAL USED SHALL BE APPROVED BY THE ENGINEER.

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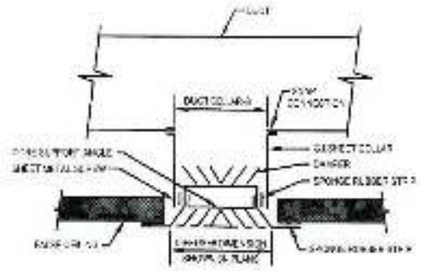
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HVAC - ELECTRICAL
DISTRIBUTION DIAGRAM

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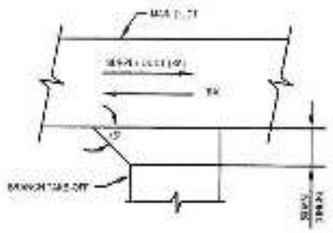
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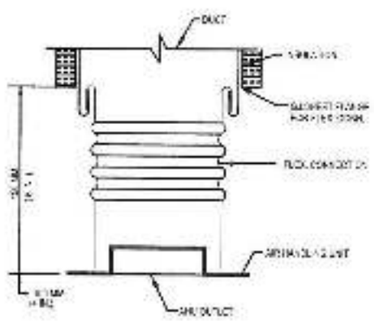
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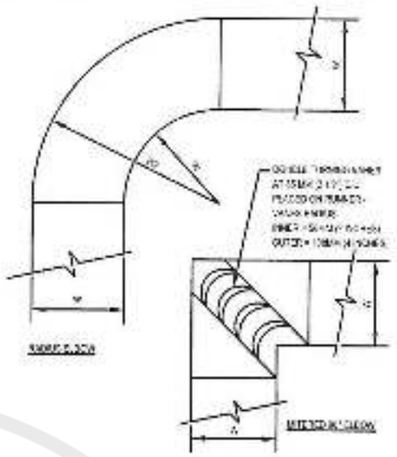
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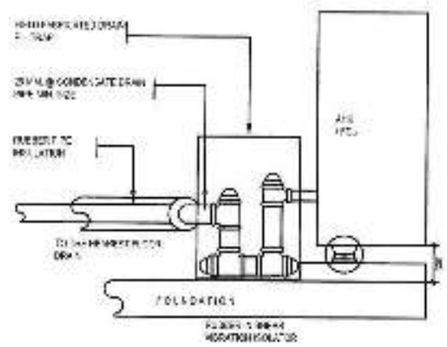
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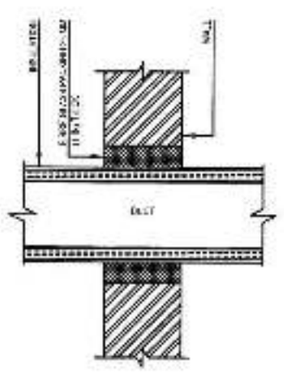
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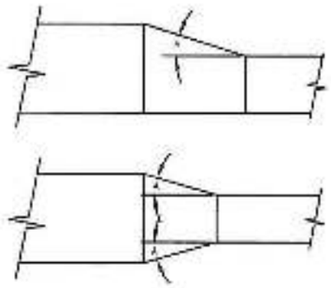
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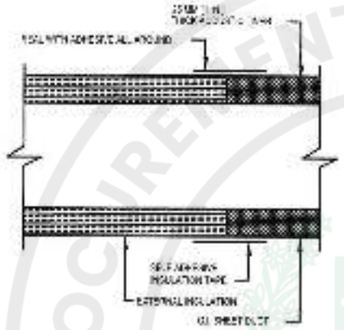
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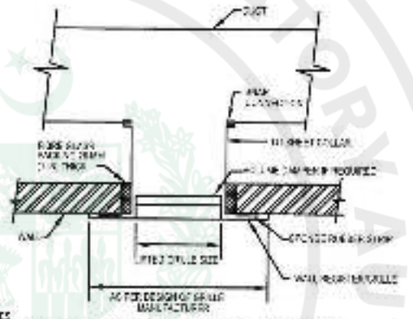
DUCT THROUGH WALL SUPPLY AND RETURN



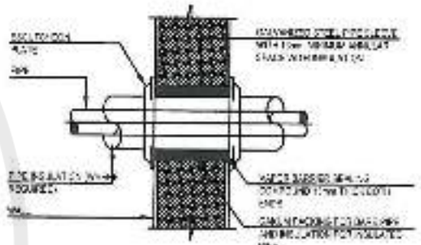
DUCT TRANSITION FABRICATION



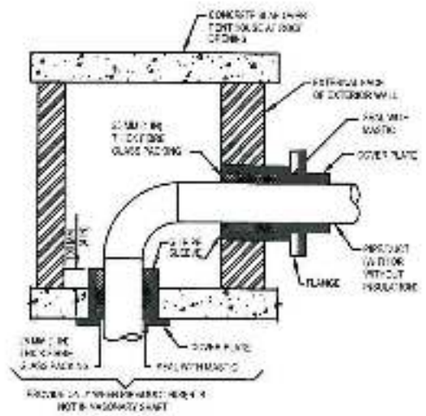
JOINT AT ACOUSTIC LINER AND EXTERIOR INSULATION



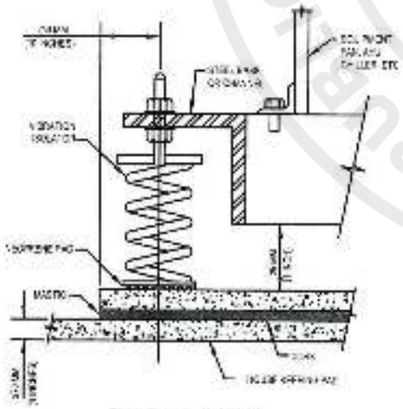
WALL REGISTER/GRILLE INSTALLATION



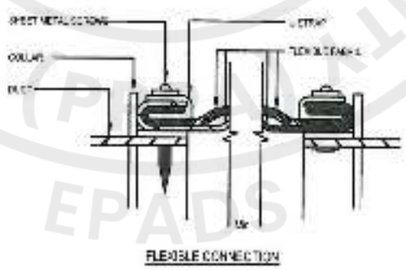
FIRE THRU WALL DETAIL



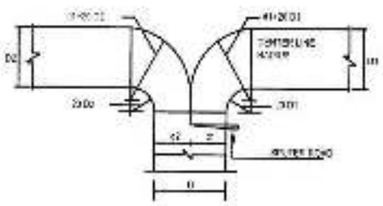
PREFORMED THRU EXTERIOR WALL AND ROOF



EQUIPMENT INSTALLATION WITH VIBRATION ISOLATOR



FLEXIBLE CONNECTION



TYPICAL TAKE OFF

NOTES:

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED.
2. FOR LEGEND, LIST OF DRAWINGS AND DETAIL SHEET REFER DRAWING NO. M-001.

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LTD. NESPAK ISLAMABAD

SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY

ACADEMIC BLOCK

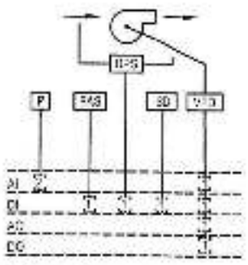
SZABMU, ISLAMABAD

HVAC - STANDARD DETAILS

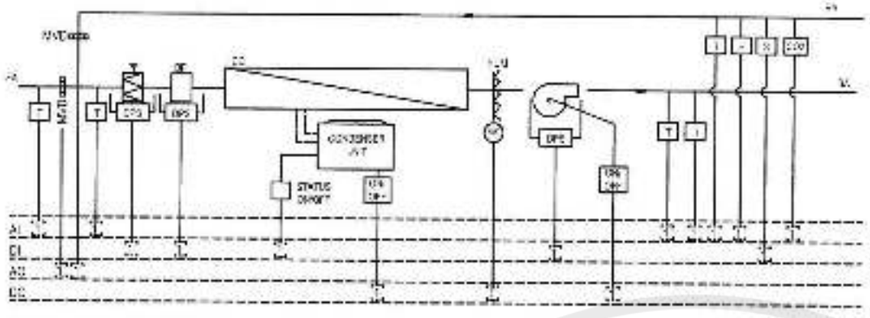
NESPAK NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LTD.

DRAWING NO. M-006

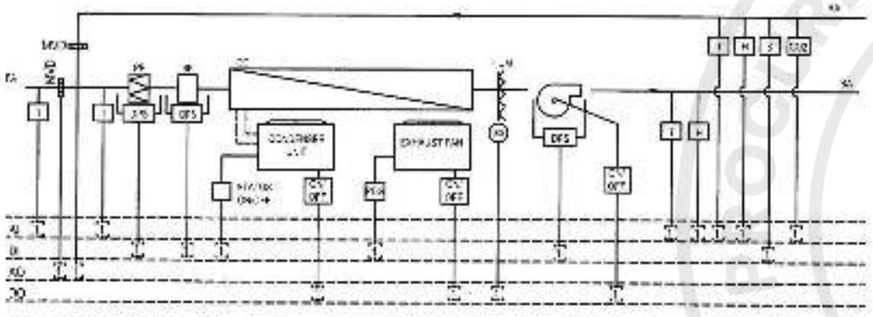
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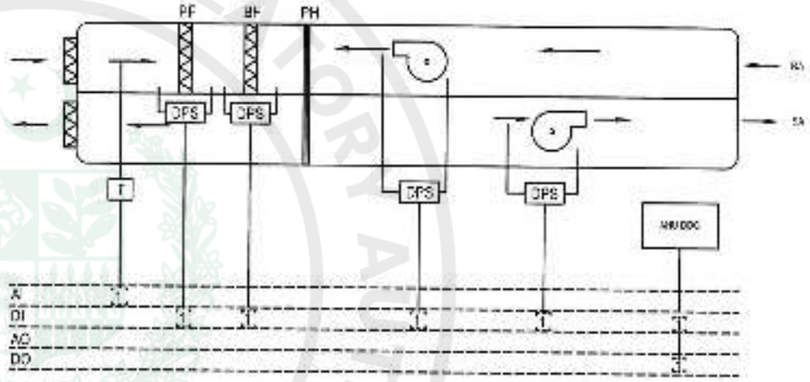
STAIRCASE/ELEVATOR
WELL PRESSURIZATION
SCHEMATIC DIAGRAM



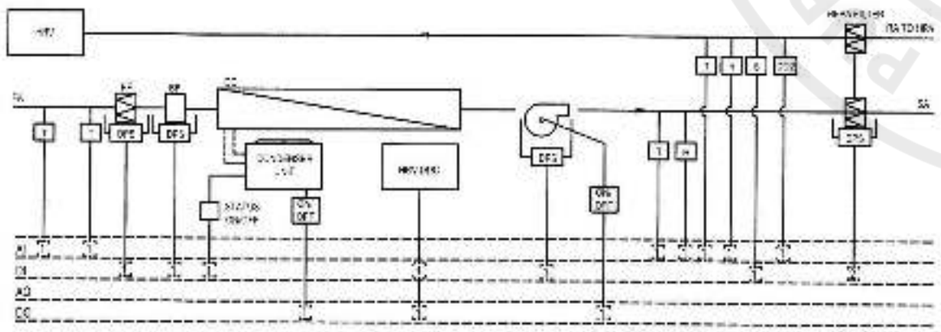
AIR HANDLING UNIT (TYPICAL FOR AHU-01, AHU-02 & AHU-04)
SCHEMATIC DIAGRAM



AIR HANDLING UNIT (AHU-03)
SCHEMATIC DIAGRAM



HEAT RECOVERY VENTILATOR (HRV-01)
SCHEMATIC DIAGRAM



AIR HANDLING UNIT (AHU-05)
SCHEMATIC DIAGRAM

CONTROL LEGEND:

T:	TEMPERATURE SENSOR
H:	HUMIDITY SENSOR
PF:	PRE-FILTER
BF:	BAG FILTER
PH:	PLATE HEAT EXCHANGER
DPS:	DIFFERENTIAL PRESSURE SWITCH
S:	SMOKE SENSOR
FAS:	FIRE ALARM SYSTEM
P:	PRESSURE SENSOR
SD:	SMOKE DETECTOR
HUM:	HUMIDIFIER
DXC:	DIRECT EXPANSION COOLING COIL
VFD:	VARIABLE FREQUENCY DRIVE
FA:	FRESH AIR
RA:	RETURN AIR
SA:	SUPPLY AIR
EA:	EXHAUST AIR
CC:	COOLING COIL

NOTES:

1. FOR LIST OF DRAWINGS AND GENERAL NOTES REFER DRAWING NO. [illegible].
2. READ THIS DRAWING IN CONJUNCTION WITH ALL RELEVANT PROJECT DRAWINGS.
3. ALL CABLING FOR INTERLINKING OF EXHAUST FAN, HRV, AHUS AND CONDENSING UNITS AS SHOWN ARE INCLUDED IN THE CONTRACTOR SCOPE OF WORK.
4. THE CONTRACTOR IS REQUIRED TO SUBMIT WIRING DIAGRAM OF DDC/EMS CONTROLLER TO INDICATE CONNECTIVITY OF SENSORS, SWITCHES AND OTHER FIELD DEVICES, AS PART OF CONTROL SYSTEM SUBMITTAL FOR CONSULTANTS REVIEW AND APPROVAL.
5. THE CONTRACTOR IS REQUIRED TO SUBMIT HVAC CONTROLS SUBMITTALS IN ACCORDANCE WITH THESE SCHEMATICS AND TENDER SPECIFICATION, FOR CONSTANTS REVIEW AND APPROVAL.
6. NECESSARY COORDINATION WITH FIRE ALARM SYSTEM DESIGN / SOLUTION IS TO BE DONE BY THE CONTRACTOR FOR FURNISHING SEQUENCE OF OPERATION OF HVAC CONTROLS.
7. FOR OUTDOOR INSTALLATION DDC SHALL BE IN WEATHER PROOF/WATER TIGHT ENCLOSURE.
8. THE SHOP DRAWING SHALL BE PREPARED ON THE BASIS OF CONSTRUCTION DRAWING AND SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL. CONSTRUCTION SHALL BE MADE ACCORDING TO THE APPROVED SHOP DRAWING.

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. NESPAK ISLAMABAD

SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY

ACADEMIC BLOCK
SZABMU, ISLAMABAD

HVAC - CONTROL DIAGRAMS

NESPAK — NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

DESIGN	DRAWN	CHECKED	DATE	SUBMITTED	
				DRAWING NO.	REV.

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

CONSTRUCTION OF ACADEMIC BLOCK OF SZABMU, ISLAMABAD
HVAC WORKS



FINANCIAL BID

BIDDING DOCUMENTS
VOLUME – IV

LETTER OF FINANCIAL BID
PREAMBLE TO BOQ
BILL OF QUANTITIES(BOQ)

0September, 2026

National Engineering Services Pakistan (Pvt) Limited
NESPAK House Sector G-5/2, Islamabad, Pakistan
Phone: +92-51-9221910 - 13 Fax: +92-51-9221914
Email: Islamabad@nespak.com.pk
http://www.nespak.com.pk

Clearance Code	4356/321/BD/69(22)	Doc No.	4356-04	Rev No.	3

SUMMARY OF CONTENTS

		PAGE NO.
(I)	LETTER OF FINANCIAL BID	LFB-1 TO LFB-2
(II)	PREAMBLE TO BILL OF QUANTITIES	PBOQ-1
(III)	DAY WORK SCHEDULE	BOQ-P1
(IV)	BILL OF QUANTITIES	BOQ-P2 TO BOQ-P11

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LETTER OF FINANCIAL BID

Letter of Bid - Financial Proposal

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

Place this Letter of Bid - Financial Proposal in the second envelope marked "FINANCIAL PROPOSAL".

The Bidder must prepare the Letter of Bid - Financial Proposal 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*]
Request for Bid No.: [*insert number of bidding process*]
Name of Project.: **Construction of Academic Block SZABMU, Islamabad – HVAC Works**
Alternative No.: Not Applicable.
To: Shahzeed Zulfiqar Ali Bhutto Medical University (SZABMU), Islamabad.

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

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

(a) **Bid Validity Period**: Our Bid shall be valid for the period specified in **BDS 18.1** (as amended, if applicable) from the date fixed for the bid submission deadline specified in **BDS 24.1** (as amended, if applicable), 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 is: PKR. _____
_____
_____

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) **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.")

(d) **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.

BILL OF QUANTITIES

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1. PREAMBLE TO BILL OF QUANTITIES

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Particular Conditions of Contract, Technical Specifications, and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
3. The rates and prices bid in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.
4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.
5. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
6. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
7. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with Sub-Clauses 13.4 and 13.5 of the General Conditions.
8. The method of measurement of completed work for payment shall be in accordance with Measurement and Payment Clauses given in the relevant Technical Specifications. Any special method of measurement stated in the text of estimate is limited to the concerned items only.
9. The following abbreviations for units have been used in Bill of Quantities:

Unit		**Abbreviations**
Cubic Feet	=	Cft
Square Feet	=	Sft
Kilogram	=	kg
Provisional Sum	=	PS
Lumpsum	=	LS, Job, Lot
Per Number	=	Each, Number, No.

DAYWORK SCHEDULE

NOT USED

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

CONSTRUCTION OF ACADEMIC BLOCK OF SZABMU, ISLAMABAD – HVAC WORKS

SUMMARY OF COST

A. COST OF WORKS:

S.NO.	DESCRIPTION	AMOUNT IN PKR.
01	HVAC WORKS	
	TOTAL =	

In Words:
(_____)

Note-1: The Bidder shall carry over the quoted amount to the form of Bid page **LPB-1.**

B. PROVISIONAL SUM:

i. DAB Fee of the Employer (one-half of the total remunerations) **PKR. 1,500,000/-**

Note-2: The Bidder shall not consider the amount stated against the Provisional Sum while quoting his Bid. All Provisional Sums amount are to be expended in whole or, in part at the direction and discretion of the Engineer in accordance with Sub-Clause 13.4 of General Conditions except with respect to DAB fees and the expenses in accordance with GC Clause 21.

Authorized Signature and Official Seal:_____

Name: _____

Date: _____

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

ACADEMIC BLOCK

BILL OF QUANITITIES

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
AB-H-01	Supply and installation of Decorative cooling/heating high ambient DC Inverter DX Rversible Type variable refrigerant flow air conditioners with ceiling cassette (CIU), wall mounted type (WIU) & fresh air ducted type indoor units (TFU), including distributers, thermostats, expansion valves, controllers with all units, central controllers etc. as per specification/drawings complete in all respect.				
i)	CIU-1 (Each Unit Capacity = 9 MBH) - 12 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 02 Nos. CIU-4 (Each Unit Capacity = 24 MBH) - 02 Nos. TFU-3 (Each Unit Capacity = 96 MBH) - 01 No. CU-6-1 (Each Unit Capacity = 336 MBH) - 01 No.	Each	1		
ii)	CIU-4 (Each Unit Capacity = 24 MBH) - 14 Nos. CU-7-1 (Each Unit Capacity = 360 MBH) - 01 No.	Each	1		
iii)	CIU-3 (Each Unit Capacity = 18 MBH) - 01 No. CIU-4 (Each Unit Capacity = 24 MBH) - 04 Nos. CIU-5 (Each Unit Capacity = 30 MBH) - 02 Nos. CU-3 (Each Unit Capacity = 216 MBH) - 01 No.	Each	1		
iv)	TFU-3 (Each Unit Capacity = 96 MBH) - 03 Nos. CU-5-1 (Each Unit Capacity = 300 MBH) - 01 No.	Each	1		
v)	CIU-2 (Each Unit Capacity = 12 MBH) - 02 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 01 No. CIU-4 (Each Unit Capacity = 24 MBH) - 02 Nos. TFU-1 (Each Unit Capacity = 48 MBH) - 01 No. CU-1-1 (Each Unit Capacity = 156 MBH) - 01 No.	Each	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
vi)	CIU-3 (Each Unit Capacity = 18 MBH) - 01 No. CIU-4 (Each Unit Capacity = 24 MBH) - 14 Nos. CU-7-2 (Each Unit Capacity = 360 MBH) - 01 No.	Each	1		
vii)	TFU-3 (Each Unit Capacity = 96 MBH) - 03 Nos. CU-5-2 (Each Unit Capacity = 300 MBH) - 01 No.	Each	1		
viii)	CIU-1 (Each Unit Capacity = 9 MBH) - 02 Nos. CIU-2 (Each Unit Capacity = 12 MBH) - 05 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 05 Nos. TFU-2 (Each Unit Capacity = 72 MBH) - 01 No. CU-4-1 (Each Unit Capacity = 240 MBH) - 01 No.	Each	1		
ix)	CIU-2 (Each Unit Capacity = 12 MBH) - 03 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 05 Nos. TFU-1 (Each Unit Capacity = 48 MBH) - 01 No. CU-2-1 (Unit Capacity = 192 MBH) - 01 No.	Each	1		
x)	CIU-3 (Each Unit Capacity = 24 MBH) - 02 Nos. CIU-4 (Each Unit Capacity = 36 MBH) - 10 Nos. CU-5-3 (Unit Capacity = 300 MBH) - 01 No.	Each	1		
xi)	TFU-3 (Each Unit Capacity = 96 MBH) - 02 Nos. CU-2-2 (Each Unit Capacity = 192 MBH) - 01 No.	Each	1		
xii)	CIU-2 (Each Unit Capacity = 12 MBH) -06 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 03 No. CIU-4 (Each Unit Capacity = 24 MBH) - 04 Nos. CU-4-2 (Unit Capacity = 240 MBH) - 01 No.	Each	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
xiii)	TFU-3 (Each Unit Capacity = 96 MBH) - 02 Nos. CU-2-3 (Unit Capacity = 192 MBH) - 01 No.	Each	1		
xiv)	CIU-1 (Each Unit Capacity = 9 MBH) - 02 Nos. CIU-2 (Each Unit Capacity = 12 MBH) - 05 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 09 Nos. CIU-4 (Each Unit Capacity = 24 MBH) - 01 No. TFU-2 (Each Unit Capacity = 72 MBH) - 01 No. CU-6-2 (Unit Capacity = 336 MBH) - 01 No.	Each	1		
xv)	CIU-1 (Each Unit Capacity = 9 MBH) - 01 No. CIU-2 (Each Unit Capacity = 12 MBH) - 01 No. CIU-3 (Each Unit Capacity = 18 MBH) - 07 Nos. CIU-4 (Each Unit Capacity = 24 MBH) - 04 Nos. TFU-1 (Each Unit Capacity = 48 MBH) - 01 No. CU-5-4 (Unit Capacity = 300 MBH) - 01 No.	Each	1		
xvi)	CIU-2 (Each Unit Capacity = 12 MBH) - 01 No. CIU-3 (Each Unit Capacity = 18 MBH) - 08 Nos. CIU-4 (Each Unit Capacity = 24 MBH) - 01 No. TFU-1 (Each Unit Capacity = 48 MBH) - 01 No. CU-4-3 (Unit Capacity = 240 MBH) - 01 No.	Each	1		
xvii)	CIU-1 (Each Unit Capacity = 9 MBH) - 01 No. CIU-2 (Each Unit Capacity = 12 MBH) - 01 No. CIU-3 (Each Unit Capacity = 18 MBH) - 04 Nos. CIU-4 (Each Unit Capacity = 24 MBH) -01 No. CIU-5 (Each Unit Capacity = 30 MBH) - 02 Nos. TFU-2 (Each Unit Capacity = 72 MBH) - 01 No. CU-4-4 (Unit Capacity = 240 MBH) - 01 No.	Each	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
xviii)	CIU-1 (Each Unit Capacity = 9 MBH) - 01 No. CIU-2 (Each Unit Capacity = 12 MBH) - 04 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 05 Nos. TFU-1 (Each Unit Capacity = 48 MBH) - 01 No. CU-2-4 (Unit Capacity = 192 MBH) - 01 No.	Each	1		
xix)	CIU-1 (Each Unit Capacity = 9 MBH) - 01 No. CIU-2 (Each Unit Capacity = 12 MBH) - 03 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 05 Nos. CU-1-2 (Unit Capacity = 156 MBH) - 01 No.	Each	1		
xx)	CIU-1 (Each Unit Capacity = 9 MBH) - 03 Nos. CIU-2 (Each Unit Capacity = 12 MBH) - 05 Nos. CIU-3 (Each Unit Capacity = 18 MBH) - 05 Nos. CIU-4 (Each Unit Capacity = 24 MBH) - 01 No. CIU-5 (Each Unit Capacity = 30 MBH) - 01 No. TFU-2 (Each Unit Capacity = 72 MBH) - 01 No. CU-5-5 (Unit Capacity = 300 MBH) - 01 No.	Each	1		
xxi)	CIU-2 (Each Unit Capacity = 12 MBH) - 01 No. CIU-3 (Each Unit Capacity = 18 MBH) - 09 Nos. TFU-2 (Each Unit Capacity = 72 MBH) - 01 No. CU-4-5 (Unit Capacity = 240 MBH)	Each	1		
xxii)	WIU-1 (Each Unit Capacity = 18 MBH) - 05 Nos. CU-8 (Unit Capacity = 90 MBH)	Each	1		
xxiii)	Essential Spare Parts as specified in Technical Provisions	Lot	1		
xxiv)	Centralized VRF Intelligent Controller to group each VRF unit controller including separate multi-functional controller to group no. of units at each floor, Control Cable & Allied Essential Accessories	Lot	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
AB-H-02	Supply and installation of DX Type Air Handling Units (AHU) with compatible Condensing Units (ACU)				
i)	AHU - 01/ ACU-01	Each	1		
ii)	AHU-02/ ACU-02	Each	1		
iii)	AHU-03/ ACU-03	Each	1		
iv)	AHU-04/ ACU-04	Each	1		
v)	AHU-05/ ACU-05	Each	1		
v)	HRV-01	Each	1		
vi)	AHU & Condensing Unit's Essential Spare Parts as per Technical Provisions	Lot	1		
AB-H-03	Supply and Installation of Control System and its Components such as control cable, sensors, pressure transmitters, smoke detectors, motorized dampers, actuators LCD DDC Controller, Pressure Differential Switches, VFD etc. & all accessories for Air Handling Units, Heat Recovery Units, Exhaust Fan, Stair Case and Elevator Shaft Pressurization. Supply and installation of all control and communication cables for automatic controls including conduits, cables ties, and all other accessories. Complete in all respect as per specifications.	Lot	1		
AB-H-04	Supply, installation of Wall Mounted Type Air Conditioner, DC Inverter high ambient 50 deg C, in the specified place including Tremote controller. The job includes connection of copper piping of out door unit fitted on roof or angle iron frame, making inter connection of the unit with suitable sizes of wire also piping for condensed water etc. Complete in all respects.				
i)	SAC-1/SCU-1 (Nominal Capcity = 18 MBH)	Each	3		
ii)	SAC-1/SCU-1 (Nominal Capcity = 24 MBH)	Each	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
AB-H-05	Supply and installation of refrigerant pipes, insulation, fittings including all accessories for complete system complete in all respect.	Lot	1		
AB-H-06	Supply and installation of uPVC Drain Pipes, insulation and fittings including all accessories complete in all respect.	Lot	1		
AB-H-07	Supply and installation of ventilation fans as per specification & drawings including all accessories and fitting complete in all respect.				
i)	EF-1 (Propeller Fan, Air Flow 150 cfm)	Each	23		
ii)	EF-2 (Centrifugal Inline, Air Flow 600 cfm, ESP = 0.50")	Each	5		
iii)	EF-3 (Centrifugal Inline, Air Flow 800 cfm, ESP = 0.75")	Each	12		
iv)	EF-4 (Propeller Fan, Air Flow 1500 cfm)	Each	4		
v)	EF-5 (Propeller Fan, Air Flow 500 cfm)	Each	4		
vi)	EF-6 (Centrifugal Inline, Air Flow 1400 cfm, ESP = 0.65")	Each	2		
vii)	EF-7 (Centrifugal Inline, Air Flow 2000 cfm, ESP = 0.10")	Each	2		
viii)	EF-8 (Centrifugal Inline, Air Flow 2100 cfm, ESP = 2.00")	Each	1		
ix)	EF-9 (Centrifugal Inline, Air Flow 5500 cfm, ESP = 0.75")	Each	1		
x)	SF-1 (Centrifugal Inline, Air Flow 11,000 cfm, ESP = 1.00")	Each	2		
xi)	SF-2 (Centrifugal Inline, Air Flow 7500 cfm, ESP = 1.00")	Each	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
AB-H-08	Supply and installation of Sheet Metal Ducting as per schedule specification & drawings including all accessories & fitting complete in all respect.				
i)	U.S GAUGE 26	Sft	18,800		
ii)	U.S GAUGE 24	Sft	24,200		
iii)	U.S GAUGE 22	Sft	21,000		
iv)	U.S GAUGE 20	Sft	700		
AB-H-09	Supply and installation of Hanging and Support arrangment as per schedule specification including all accessories & fitting complete in all respect.	Lot	1		
AB-H-10	Supply and installation of insulation as per schedule given in specification & drawings including all accessories complete in all respects.				
i)	Indoor Supply/Return Air Duct concealed to vision, Outdoor Air Duct passing through conditioned space and passing through equipment room	Sft	35,160		
ii)	Supply/Return Air Duct outside exposed to vision	Sft	2,500		
iii)	Acoustic Liner for Supply Air Ducts & Plenums	Sft	105		
AB-H-11	Supply and installation of flexible duct connectors (Width 6") for complete system as per specification & drawings with accessories and fitting complete in all respect.	Rft	150		
AB-H-12	Supply and installation of volume damper for complete system as per specification/ drawings with accessories and fitting complete in all respect.	Sft	400		
AB-H-13	Supply and installation of fire damper for complete system as per specification/ drawings with accessories and fitting complete in all respect.	Sft	60		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
AB-H-14	Supply and installation of fresh air intake/ Exahust air washable metallic mesh filters for air handling units for complete system as per specification/ drawings with accessories and fitting complete in all respect.	Sft	50		
AB-H-15	Supply and installation of Ducted Mounted HEPA filters (H13) and its housing for installation in Labs as per specification/ drawings with accessories and fitting complete in all respect.				
i)	HF-1 (Air Flow Rate: 2000 CFM)	No.	1		
ii)	HF-2 (Air Flow Rate: 11200 CFM)	No.	2		
AB-H-16	Supply and installation of air devices for complete system as per specification & drawing with all accessories and fitting complete in all respect.				
i)	CODE A: Supply Air Four Way Square/Rectangular Face Ceiling Diffusers	Sft	250		
ii)	CODE B: Return & Exhaust Air Four Way Square/Rectangular Face Ceiling Diffusers	Sft	210		
iii)	CODE C: Return Air Adjustable Side Wall Grille	Sft	15		
iv)	CODE D: Outdoor/Exhaust Air Anti Bird & Anti Vermin Screen Louvers	Sft	150		
AB-H-17	Supply and Installation of relevant electrical equipment and control work with all accessories.				
i)	ACP 01 (details to be supplied by the Contractor)	Each	1		
ii)	ACP 02 (details to be supplied by the Contractor)	Each	1		
iii)	ACP 03 (details to be supplied by the Contractor)	Each	1		
iv)	ACP 04 (details to be supplied by the Contractor)	Each	1		
v)	ACP 05 (details to be supplied by the Contractor)	Each	1		

HVAC WORKS

ITEM No.	DESCRIPTION	UNIT	QTY.	UNIT RATE (PKR.)	TOTAL AMOUNT (PKR.)
(a)	(b)	(c)	(d)	(e)	(f)
vi)	ACP 06 (details to be supplied by the Contractor)	Each	1		
vii)	ACP 07 (details to be supplied by the Contractor)	Each	1		
viii)	ACP 08 (details to be supplied by the Contractor)	Each	1		
ix)	ACP 09 (details to be supplied by the Contractor)	Each	1		
x)	Relevant electrical works including cables, cable trays, PVC conduits, hangers, supports etc. complete in all respect except ACPs mentioned in Item (i to ix) here above.	Lot	1		
AB-H-18	Relevant civil works required to complete the system including, equipment foundations, cutting, dismantling, patching, repairing, boxing, opening, sealing etc. complete in all respect.	Lot	1		
AB-H-19	Testing & Commissioning of overall HVAC system.	Lot	1		
AB-H-20	Operations & Maintenance of overall HVAC system during Defect Liability Period as specified.	Months	12		
				Total (PKR.) =	

Appendix C

FORMULA FOR ADJUSTMENT OF FOREIGN EXCHANGE RATES FOR IMPORTED PLANT/ EQUIPMENT AND MATERIALS

All payments shall be made in Pak Rupees only; however, increase or decrease in exchange rate of foreign currency would be paid to or deducted from Contractor's for following goods of imported items:

i. Air-Handling Units (SOP Item No. AB-H-02)
ii. Variable Refrigerant Flow (VRF) Units (SOP Item No. AB-H-01)

Price Adjustment (increase or decrease) for any foreign currency transactions against Letter of Credit (L/C) for import of the Goods shall be made as under:

PA1 = LC1 (RR1-BR) + LC2 (RR2-BR) + …….. + LCn (RRn-BR)

Where,

PA1 = Price Adjustment in PKR for any foreign currency transactions against L/C.

LC1, LC2, LCn = L/C amount in foreign currency for the respective item.

BR = Base exchange rate prevailing on 28th day prior to the deadline for submission of Bids

RR1, RR2, RRn = Revised/current exchange rate prevailing on the date of Payment against L/C of the respective item

and Price Adjustment (increase or decrease) for corresponding import duties & indirect taxes, dependent on cost of Goods imported against L/C, shall be made as under:

$$PA_2 = CD_1\left(1-\frac{BR}{RR_3}\right)+CD_2\left(1-\frac{BR}{RR_4}\right)+\ldots\ldots\ldots\ldots+CD_n\left(1-\frac{BR}{RR_n}\right)$$

Where,

PA_2 = Price Adjustment for import duties & indirect taxes in PKR;

CD_1, CD_2, CD_n = Value of import duties & indirect taxes actually paid by the Contractor in PKR

BR = Base exchange rate prevailing on 28th day prior to the deadline for submission of Bids

RR_3, RR_4, RR_n = Revised exchange rate used by Custom authorities for calculation of import duties & indirect taxes.

The rates of exchange to be used in above adjustments shall be Telegraphic Transfer & Over Draft (TT&OD) Selling Rates published or authorized by the State Bank of Pakistan.

The L/C would be opened by the Contractor or subcontractor or authorized agent/ distributor at his own cost bearing the name of Employer and “Name of Works”. The Contractor shall provide all requisite documents which may include but not limited to Bill of Lading, Letter of Credit documents, shipping documents, custom duties, goods declaration form.

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

CONSTRUCTION OF ACADEMIC BLOCK OF SZABMU, ISLAMABAD
HVAC WORKS



TECHNICAL BID

BIDDING DOCUMENTS
VOLUME – II

SPECIFICATIONS
PART-A – SPECIFIC PROVISIONS
PART-B – TECHNICAL PROVISIONS

September, 2026

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SPECIFICATIONS

SPECIFIC PROVISIONS (GENERAL)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

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THE SPECIFICATIONS

SPECIFIC PROVISIONS (GENERAL)

1. GENERAL

1.1 The Specifications Part A – Specific Provisions shall form an integral part of Bid and the Contract documents.

1.2 The Contractor shall notify all sub-contractors of the provisions of these Specific Provisions.

2. DESCRIPTION OF PROJECT, WORKS INVOLVED AND SITE

Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), intends to carry out supply, installation, testing, commissioning, operation and maintenance of HVAC system of Academic Block of SZABMU, Islamabad.

The scope of this Project mainly comprises of HVAC works and related ancillary works lying within the boundaries and limits shown on the Drawings and any such additional areas adjacent thereto as may be designated by the Engineer from time to time for the construction to be performed under the Contract, and all such areas and additional areas shall comprise the Site.

3. CODES, STANDARDS AND CERTIFICATES

A. Applicable Standards

Except as otherwise provided by these Specifications or the Drawings, all materials, equipment and fabrication and testing thereof shall conform to the latest applicable standards and codes referred in the Specifications by use of the abbreviations explained below.

ASCE		American Society of Civil Engineers
ASA		American Standard Association
ACI	-	American Concrete Institute (USA)
AISI	-	American Iron and Steel Institute (USA)
AISC	-	American Institute of Steel Construction (USA)
ANSI	-	American National Standard Institute (USA)
ASTM	-	American Society for Testing and Materials (USA)
AASHTO	-	American Association of State Highway & Transportation Officials
AWS	-	American Welding Society (USA)
BS	-	British Standards (UK)
CP	-	Codes of Practice (UK)
ICAO		International Civil Aviation Organisation
BSICP		British Standard Institute Code of Practice
PS	-	Pakistan Standards (Pak)
PCA		Portland Cement Association
PSI		Pakistan Standard Institute
SSPC	-	Steel Structures Painting Council (USA)
UBC	-	Uniform Building Code (USA)
USBR	-	United States Bureau of Reclamation (USA)

If the Contractor, at any time and for any reason, wishes to deviate from the above standards or desires to use material or equipment not covered by the above standards, he shall state the exact nature of the changes, the reason for making the change and shall submit complete specifications of the materials and equipment to the Engineer for approval.

B. Standards other than those Specified

Where requirements for materials or equipment are specified by reference to a standard which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards, including

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standards of other countries, will be accepted provided the requirements thereof, in the sole opinion of the Engineer, are at least equal to the requirements of the standard specified. The Contractor may propose to the Engineer an equivalent standard other than that specified, in which case he shall submit the proposed standard and all other information required and shall submit written proof that his proposed standard is equivalent in all significant respects to the standard specified. All submissions must be made in the English language.

C. Codes and Standards at Site

The Contractor shall supply and have at his site office -

a) Copies of all latest editions of codes and standards referred to in these Specifications or equivalent codes and standards as approved by the Engineer.

b) Catalogues and published recommendations from manufacturers supplying products and materials for the project.

c) The Contractor shall provide manufacturer's or supplier's materials which must meet the requirements of a specific code or standard as stated in these Specifications.

4. MANUFACTURER'S RECOMMENDATIONS

Installation of manufactured items shall be in accordance with procedures recommended by the manufacturer or as approved by the Engineer.

5. UNITS OF MEASUREMENTS

The FPS System of Units shall be used throughout the Project.

6. EXISTING CONDITION AT SITE

Drawings and information pertaining to existing project conditions are furnished for reference. Neither the Employer nor the Engineer warrants the adequacy or correctness of these. The Contractor's are encouraged to visit the project site to assess the existing site conditions.

7. PROTECTION AND PRECAUTIONS

The Contractor and his sub-contractors shall afford all necessary protection to existing structures and will be required to make good at his own expense any damage done to such structures through his own or his representatives or subcontractors' fault and negligence.

The Contractor and his sub-contractors shall afford all necessary protection to existing roads in the area. He will clear and make good at his own expense any damage to or debris on these roads through his own fault and negligence. He must at all time ensure the free and normal flow of traffic and shall not cause obstruction to the traffic system. The Contractor and his sub-contractors shall provide and maintain necessary protection and precautionary measures such as warning signs, warning lamps and barricades etc. to prevent accidents.

The Contractor shall promptly correct all such damage to original condition at no addibonal expense to the Employer.

The Contractor shall cooperate with trades performing work under other Contracts as necessary for completion.

8. SEQUENCE OF CONSTRUCTION

The Contractor shall submit his proposal for approval of the Engineer the sequence of Construction, prior to starting the works. The works shall be executed as per approved sequence of construction.

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9. LINES AND LEVELS

Survey control points will be established by the Engineer. The Contractor shall be responsible for verifying these and shall be responsible for all requirements necessary for the execution of any work to the locations, lines, and levels specified or shown on the drawings, subject to such modifications as the Engineer may require as work progresses.

10. PLANT, EQUIPMENT AND TOOLS

The Contractor shall provide at his cost modern plant, equipment and tools, adequate and befitting to the nature, magnitude and size of this Contract, in strict compliance with the requirements of the General Conditions of Contract, Conditions of Particular Applications and Technical Specifications.

11. PARTIAL POSSESSION

Whenever, as determined by the Employer any portion of work performed by the Contractor is in a condition suitable for use, the Employer may take possession of or use such portion.

Such use by the Employer shall in no instance be construed as constituting final acceptance, and shall neither relieve the Contractor of any of his responsibilities under the Contract, nor acts a waiver by the Employer of any of the conditions thereof, provided that the Contractor shall not be liable for the cost of repairs, re-work, or renewals which may be required due to ordinary wear and tear resulting from such use. However, if such use increases the cost or delays to the completion of remaining portions of work, the Contractor will be entitled to an equitable adjustment.

If, as a result of the Contractor's failure to comply with the provision of the Contract, such use proves to be unsatisfactory, the Employer will have the right to continue such use until such portion of the work can, without injury to the Employer, be taken out of service for correction of defects, errors, omissions, or replacement of unsatisfactory materials or equipment, as necessary for such work to comply with the Contract, provided that the period of such operation or use pending completion of appropriate remedial action shall not exceed twelve months unless otherwise mutually agreed upon in writing between the parties.

12. EXISTING SERVICES

The Contractor shall search for, find, locate and protect any wiring, cable, duct, pipework, etc., within or immediately adjoining the site area.

The Contractor shall take full responsibly for safety of existing service lines, utilities and utility structures uncovered or encountered during excavation and construction operations.

The Contractor shall take full responsibility for damaging any such service lines, utility/utility structure and any cost and/or expense that arises or issues from any such damage shall be borne directly by himself. Should any damage to any such service occur the Contractor shall forthwith take remedial action, initiate safety precautions, install temporary services and carryout repair all at his own cost and expense and inform the Engineer and notify all relevant authorities.

Existing utilities which are to remain in service for or after the works are to be determined by the Contractor. If any existing service lines, utilities and utility structures which are to remain in service are uncovered or encountered during these operations, they shall be safeguarded, protected from damage, and supported. The Contractor shall preserve, maintain and keep in perfect working conditions, any existing facilities required to be preserved by the Employer/the Engineer.

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13. CONSTRUCTION AREA AND ACCESS

The Employer will provide the Contractor possible space within or nearby the area of site of works for the storage of plant, equipment and materials and for Contractor's temporary office, during the currency of the Contract. In case the adjacent area as required by the Contractor is not available within the Project boundary for storage of plant, equipment and machines then the Contractor shall arrange at his own expense possible space for storage of plant, equipment and machines at his own cost and expense. On no account shall such temporary installations conflict/interfere with any of the permanent installations, services and any operational function of Employer. The handling and storage of all plants, equipment and materials at site shall be the sole responsibility of the Contractor and at no risk and cost to the Employer.

The Contractor shall protect all material against corrosion, mechanical damage or deterioration during storage and erection on site. The protection methods shall be to the approval of the Engineer.

14. CONSTRUCTION AND CHECKING AT SITE

The Contractor shall submit to the Engineer in due time for approval and discussion, his proposals and plans as to the method and procedure to be adopted for the temporary and permanent works involved.

The submitting to these suggestions and arrangements, and the approval thereof by the Engineer shall not relieve the Contractor of his responsibilities and duties under the Contract.

The carrying out of all work included in the Contract is to be supervised by a sufficient number of qualified representatives of the Contractor and full facilities and assistance are to be afforded by the Contractor for the Engineer or his Representative to check and examine the execution of the work.

The Engineer reserves the right to inspect all parts of the works but may at his discretion waive inspection on certain items. This shall in no way absolve the Contractor from his responsibilities. This particularly applies to the checking of materials, the accurate setting out of foundations, and to the leveling, setting and aligning of the various parts, and to the proper fitting and adjustment of manufactured and finished materials and fixtures in position.

If the Engineer or his Representative find that the work progress is slow in such a way that the works or parts thereof will not be completed in the time specified, then he shall order the Contractor to work overtime or in shifts and the Contractor shall comply. These arrangements will be free of all financial encumbrances and at no additional costs to the Employer.

In the event of night work, the Contractor shall provide sufficient and adequate lighting to the satisfaction of the Engineer or his Representative and shall supply the necessary manpower for satisfactory continuation of the work after normal hours.

15. STORAGE & HANDLING FACILITIES

The Contractor shall make his own arrangements for providing the necessary space for the storage of plant, equipment and materials and for Contractor's temporary office, in and around the site of works, during the currency of the Contract.

16. PRODUCT DATA

Manufacture's standard schematic drawings shall be modified or deleted to indicate only information which is applicable to the project. Such standard information shall be supplemented to provide all additional applicable information.

Manufacturer's catalogue sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive literature shall be clearly marked to identify pertinent materials products or models. Dimensions and required clearances shall be indicated. Shop performance characteristics and capacities shall be noted.

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17. PRODUCT QUALITY AND HANDLING

Suppliers of local and foreign products and installations specified shall have been regularly engaged in the business of manufacturing, fabricating, installing and / or servicing work required for a period not less than 5 years. In addition, the Engineer may request as appropriate a:

- list of similar installations that describes project, scope and date of completion.
- complete literature, performance data, and technical data.
- list of services record within Pakistan.
- location of service office from which this installation could be maintained.

For the actual fabrication, installation and testing of the specified work use only thoroughly trained and experienced workmen completely familiar with the items required and with the manufacturers recommended methods of installation. In acceptance or rejection, no allowance will be made for the lack of skill on the part of workmen.

Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacement necessary for approval and at no additional cost to the Employer.

18. INSPECTION & TESTS REPORTS

All equipment and materials furnished under these specifications and all work performed in connection therewith will be subject to rigid inspection by the Engineer or the Engineer's Representative. Acceptance of equipment and material or the waiving off inspection thereof shall in no way relieve the Contractor of his responsibility for meeting the requirements of the Contract.

The Contractor shall furnish the Engineer with certified true copies of test reports of all materials used in the manufacture and fabrication of all equipment and material including metal work, steel pipes, fire bricks etc. The result of these test shall be in such form as to show compliance with the applicable Specifications, standards and codes for the material used.

19. FIELD LABORATORY AND TESTING

19.1 General

The Contractor shall provide and maintain a field laboratory equipped with approved equipment to perform all the tests required by the Engineer. The quality control testing shall be performed by the Contractor's competent personnel in accordance with a site testing and quality control programme to be established by the Contractor and approved by the Engineer. The Engineer may however, require certain tests to be performed in any other laboratory designated by him.

The Contractor shall provide laboratory helpers to the Engineer for testing. The laboratory shall be run by a qualified material Engineer and Laboratory Technician to be employed by the Contractor.

The Field Laboratory, including all equipment and staff shall be placed at the disposal and direction of the Engineer during the Contract.

The Contractor shall keep a complete record of all quality tests performed on site.

All quality control and tests shall be carried out in accordance with applicable standards and codes.

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19.2. Field Laboratory Equipment Requirements

The Laboratory shall be equipped with new unused and latest Equipment to perform tests as per Technical Specifications and General Conditions of Contract. Additional equipment/materials shall be supplied by the Contractor as and when required by the Engineer to perform any specified test, at no additional cost to the Employer.

The laboratory shall also be equipped with new unused furniture, fittings and fixtures. If any equipment, furniture, fitting or fixture becomes unserviceable for any reason what so ever, the Contractor shall promptly replace the same as and when directed by the Engineer.

19.3. Testing Laboratory Certificates

The Engineer may accept a certificate from a commercial testing laboratory, satisfactory to him, certifying that the product has been tested within a period acceptable to the Engineer and that it conforms to the requirements of these specifications.

19.4. Method of Payment

The cost of providing running and maintenance of the laboratory, equipment, materials and staff, testing charges for materials supplied by the Employer and all other tests to be performed in any other laboratory designated by the Engineer shall be deemed to be included in the price quoted by the Contractor and no separate claim for payment on this account shall be entertained by the Engineer. Furthermore, the cost of any additional laboratory, field and shop tests required through the resubmission of samples because of failure of compliance with Specifications shall be borne by the Contractor.

In case the Contractor does not provide the specified equipment and testing facility, cost of testing plus 100 percent overheads shall be recovered from his bills.

20. SURVEYING INSTRUMENTS

20.1 General

The minimum quantity of survey equipment is stated below which shall be available with the Contractor at site of Works along with qualified Surveyors and Survey Helpers. The equipment shall be maintained throughout the Contract Period and replaced by the Contractor in case of damage or loss. The survey equipment shall be made available to the Engineer when requested. All surveying equipment shall be in good working condition.

20.2 Surveying Equipment Required

The Contractor shall provide and maintain the following surveying equipment at site.

a) Automatic Levels with tripods & staff 01 Nos.
c) All other miscellaneous tools, equipment and materials required in surveying.

21. APPROVAL OF MATERIALS AND PLANT

21.1 Quality of Materials

All materials, fixtures, fittings, supplies and plant furnished under the Contract shall be new and unused, standard first grade quality and of the best workmanship and design. No inferior or low-grade materials, supplies or articles will be either approved or accepted, and all work of assembly and construction shall be done in a first-class and workmanlike manner. In asking for prices for materials intended for delivery to the Site and incorporation in the Works under any portion of these Specifications, the Contractor shall provide the manufacturer or supplier with complete information as

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may be necessary to secure compliance to this Clause and, in every case, he shall quote this Clause in full to each such manufacturer or supplier.

21.2 Submission of Samples and Data

21.2.1 The Contractor shall furnish for approval of the Engineer with reasonable promptness all samples as directed by the Engineer or specifically called for in the Specifications and in accordance with the time schedule provided in the schedule of submittals. The Engineer shall check and approve such samples with reasonable promptness only for conformance with the design concept of the Works and for compliance with the information given in the Contract Documents. All work shall be in accordance with approved samples.

21.2.2 Samples shall be furnished so as not to delay fabrication, allowing the Engineer reasonable time for consideration of the sample submitted.

21.2.3 Each sample shall be properly labeled with the name and quality of the material, manufacturer's name, name of the project, the Contractor's name and the date of submission, and the Specifications Article number to which the sample refers.

21.2.4 The manufacturer's installation directions shall be provided with each sample. The Contractor shall pay all transportation costs and deliver samples to the Engineer's office, Site or testing laboratory as directed by the Engineer.

21.2.5 Samples shall be of adequate size to permit proper evaluation of the material by the Engineer. Where variations in colour, texture, dimensions or other characteristics are to be expected, the Contractor shall submit samples showing the maximum range of variation. Materials exceeding the range of variation of the approved samples shall not be used on the Work.

21.2.6 In order to permit coordinated selection of colours and finishes, the Contractor shall deliver samples of all related items to the Engineer at one time. Samples of such materials will not be approved until all related samples have been submitted.

21.2.7 If both Shop Drawings and samples are required for the same item, the Engineer may require both to be submitted before approving either.

21.2.8 The Contractor shall erect Mock-up samples of finished items where specifically called for in the documents or as directed by the Engineer.

The Mock-up samples shall be preserved/protected by the Contractor till the end of the project or as directed by the Engineer.

21.2.9 No acceptance or approval of any Shop Drawings or sample, or any indication or request by the Engineer on any Shop Drawings shall constitute an authorization for any increase in the Contract Sum.

21.3 Inspection

All material and Plant furnished and all work performed under this Contract will be subject to inspection by the Employer and the Engineer at all times and in all states of completion both off-Site and on-Site. The Contractor shall furnish promptly without additional charge, all facilities, labour and materials reasonably needed for performing such inspection and testing as may be required by the Engineer.

21.4 Approved Sample At Site

The Contractor shall, at all times, keep on the Site approved samples. All such samples shall be made available to the Engineer as and when required.

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22. BAR BENDING SCHEDULE

Bar bending (reinforcement bars) schedule of all structural drawings shall be prepared by the Contractor and submitted in triplicate to the Engineer for approval.

23. DRAWINGS

23.1 Bid Drawings

Bid Drawings issued with the Bid Documents, called the Bid Drawings, show scope of the work to be performed by the Contractor. The Drawings are generally in sufficient detail so as to be used as a basis for construction, fabrication and for placing orders for materials subject to corrections based on the future issue of supplementary Drawings as provided under Sub-Clause 23.2 hereof.

23.2 Construction Drawings, Supplementary Drawings

Upon commencement of the works and furnishing by the Contractor stake out survey plan and natural ground levels, the Engineer shall issue Construction Drawings to the Contractor. The Construction drawings may be issued in stages, where necessary.

The Engineer shall have authority to issue to the Contractor, from time to time, such supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defects therein. The Contractor shall follow these drawings.

When additional information regarding the geological formations or other conditions becomes available, the Engineer may find it desirable to change dimensions or design of one or more of the features of the Works to conform to the newly disclosed conditions. The Engineer reserves the right to make such reasonable changes, and the Contractor's operations shall be conducted so as to accommodate any such reasonable changes in the Works.

23.3 Definition of Term Drawings

The term Drawings as used in the Specifications means the Drawings referred in Clauses 23.1 and 23.2 above.

23.4 Checking of Drawings

The Contractor shall check all Drawings carefully as soon as practicable after receipt thereof, and shall promptly notify the Engineer of any errors discovered.

23.5 Copies of Drawings

Drawings will be issued to the Contractor as described below:

23.5.1 Construction Drawings

Two (2) sets of the Construction Drawings will be issued to the Contractor as stated above, free of charge. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

23.5.2 Supplementary Drawings

Two (2) prints of each supplementary Drawing will be issued to the Contractor free of charge. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

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23.6 Drawings to Be Furnished By the Contractor

The Contractor shall submit to the Engineer for review, such drawings as are required under the Contract, sufficiently in advance of the work intended to be executed.

23.6.1 Reinforcement Drawings

Reinforcement placement drawings and bar bending schedules (to be provided by the Contractor as per clause 22 above) of all RCC work shall be prepared by the Contractor and submitted in triplicate to the Engineer for approval, sufficiently in advance of the works in which they are intended to be used.

23.6.2 Shop Drawings

(a) The Contractor shall submit to the Engineer for review three (3) copies of all drawings to be issued for setting out, fabrication, supply order and construction, based on data, requirements, dimensions, details, codes, standards and design provided in the drawings issued by the Engineer. Such drawings shall be submitted at least seven (7) days before they are required for use. If within a period of seven (7) days after submission, the Engineer notifies the Contractor that a drawing fails to comply with the relevant requirement of the Contract, it shall be rectified and resubmitted for approval at the Contractor's cost. Fabrication or construction shall not commence on any part of the Works until the shop drawings or construction drawings for that part of the Works have been approved by the Engineer.

The Works shall be executed in accordance with the drawings as approved by the Engineer. If the Contractor wishes to modify any approved drawings, he shall immediately notify the Engineer and submit revised drawings for approval. If the Engineer instructs that further drawings are necessary for executing the Works, the Contractor shall prepare such drawings and submit them for approval.

The Contractor at his cost shall rectify errors, omission, ambiguities, inadequacies and other defects.

Approval by the Engineer, in accordance with this paragraph, shall not relieve the Contractor of any of his responsibilities under the Contract.

(b) The shop drawings shall be properly identified indicating the part of the Works, the name of the contractor / supplier etc., the date of preparation and the dates of all revisions. The Shop Drawings shall be complete and shall show the design dimensions, proposed materials to be used, finishes, type of shop paint and all other details in connection thereto.

(c) Where adjoining work requires shop drawings, the Contractor shall prepare and submit composite shop drawings, which shall show and define the work under all affected trades. If the Contractor executes work before coordinating with other trades so as to cause interference with work of those trades, he shall make changes necessary to correct the conditions without extra cost to the Employer.

(d) No changes shall be made by the Contractor in the resubmitted shop drawings in excess of the corrections spelled out by the Engineer and in a separate note on the shop drawings.

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(e) No work in the shop shall be started and no material or plant ordered until the Engineer has approved the shop drawings. It shall be the responsibility of the Contractor to submit the shop drawings on a schedule that allows reasonable time for checking and approval and subsequent fabrication. Failure to submit shop drawings in ample time for checking, correcting, and rechecking will not justify extension of time for completion of the Works.

(f) The Contractor shall also check and verify all site measurements whenever requested by other Specialist Contractors or by other Sub-Contractors to enable them to prepare their own shop drawings and pass on the information with sufficient promptness, so as not to delay the work in any way. A copy of all such information passed on shall be given to the Engineer.

23.6.3 As-Built Drawings

The Contractor shall, at all times, keep on Site a separate set of prints of all drawings on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. The Subcontractor(s) for plumbing, mechanical and electrical shall, at all times, keep on Site, a separate set of prints of the drawings (showing their parts of the Works) on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. Such drawings shall show the exact physical location and configuration of the works as actually installed.

The Contractor shall, within fourteen (14) days of issuance of Taking-Over Certificate for whole of the Works, furnish to the Engineer for his approval two (2) copies of such marked up drawings. One (1) copy of each of the marked up drawings approved by the Engineer shall be returned to the Contractor by the Engineer and these shall be used for the preparation of the As - Built Drawings.

The Contractor shall furnish to the Engineer six (6) complete sets and one reproducible copy of all As -Built Drawings within twenty eight (28) days of receipt of drawings stated above, from the Engineer.

24. PROTECTION OF THE WORKS

The Contractor shall whenever necessary cover up and protect the works from weather and damage by his own or other workmen performing subsequent operation. The Contractor shall provide all necessary dustsheets, barriers and guard rails and clear away the same at completion.

25. RESTORATION AND CLEANING

Upon completion of the works the Contractor shall restore all items covered by the Contract to the satisfaction of the Engineer.

The Contractor shall do regular cleaning and clear away all rubbish and excess materials that may accumulate from time to time on completion and before handing over. Upon completion of the works he shall obliterate all signs of temporary construction facilities such as work areas, structures, foundations of temporary structures, stock piles of excess or waste materials, or any other vestiges of construction, as directed by the Engineer. All buildings shall be cleaned, floors and paving scrubbed and the works and site shall be left in a clean and satisfactory state for immediate use and occupation. Care shall be taken not to use any cleaning materials, which may cause damage to the surface to be cleaned.

The Contractor shall also take all necessary precautions to keep the works and site free from vermin during construction and he shall leave the works vermin free on completion. Application of

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pest control agents shall not commence until the specific product, name, method and extent of application have been submitted to and approved of by the Engineer.

26. SITE OFFICE AND TEMPORARY FACILITIES TO BE PROVIDED BY THE CONTRACTOR

26.1 Contractor's Office, Facilities Etc.

The Contractor shall establish and maintain a Site office. The Contractor shall provide all facilities in connection with the execution, completion, of the Works, remedying defects therein and maintenance of the utilities services. The facilities shall not be limited to the Contractor's Site Office, labour camps, work yard and storage areas, temporary water supply, waste water disposal, temporary electricity, medical unit, temporary roads, fire protection and fire fighting equipment etc. The Contractor shall be solely responsible for arranging all utilities and the Contractor shall setup, maintain and operate an architectural and engineering facility at site with adequate number of technical and support staff as well as equipment required for particular nature of job covered under the Contract to prepare drawings/shop drawings for approval of the Engineer.

The Contractor shall arrange his labour camp, work yard, storage area and site office.

26.2 Temporary Roads

The Contractor shall prepare and maintain such temporary roads as may be necessary, from the site to the nearest road and also within the plot. Such roads shall be positioned strictly in accordance with the Engineer's instructions and the Contractor shall reduce or control any dust nuisance by regularly spraying water and compaction as directed.

26.3 Temporary Services

26.3.1 Temporary Water Supply

The Contractor shall supply in sufficient quantity all necessary potable and other water for construction purposes for all trades at points within a reasonable distance of any building being constructed. The Contractor shall make arrangements and pay charges for water service installation, maintenance and removal thereof, and pay the costs of water for all trades.

At completion of the work, the temporary water services equipment and piping shall be removed by the Contractor at his own expense.

26.3.2 Temporary Electricity

The Contractor shall make all the necessary arrangements for a temporary electricity service, pay all expense in connection with the installation, operation and removal thereof and pay the costs of electricity consumed by all trades. The Contractor shall arrange and furnish an Electric Power Generating set at site and maintain the generating set in perfect working condition through-out the duration of Contract. The generating power of the set shall be sufficient to operate all plant and equipment as well as the camps and offices of the Contractor and the offices of the Engineer/Employer, during construction at site. Should the set fail to meet the required demand at site or fail to function or operate, the Contractor shall immediately replace the same with other generating set/sets to the satisfaction of the Employer as well as the Engineer.

A temporary lighting system shall be furnished, installed and maintained by the Contractor as required to satisfy the minimum requirements for safety and security and to the satisfaction of the Engineer.

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When the permanent electrical power and lighting systems are in an operating condition, they may be used for temporary power and lighting for construction purposes provided that the Contractor obtains the written approval of the Engineer and the Employer and assumes full responsibility for the entire power and lighting system and pays all costs for operation and maintenance of the system.

At completion of construction work, or at such time as the Contractor makes use of permanent electrical equipment and devices, temporary electricity services shall be removed by the Contractor at his own expense.

26.3.3 Waste Disposal

The Contractor shall make such temporary provisions as may be required in order to dispose of any chemicals, fuels, oils, grease, bituminous materials, waste and soil waste and the like without causing pollution to either the site or the environment. Disposal of any materials, wastes, effluent, garbage, oil, grease, chemicals and the like shall be in areas specified by the concerned local authority proposed by the Contractor and subject to the approval of the Engineer. If any waste material is dumped in unauthorized areas the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed off as directed by the Engineer and replaced with suitable fill material compacted and finished with topsoil all at the expense of the Contractor.

26.3.4 Fire Protection

The Contractor shall provide and maintain adequate fire protection in the form of barrels of water with buckets, fire bucket tanks, fire extinguisher, or other effective means ready for instant use, distributed around the project and in and about temporary inflammable structures during construction of the works.

Gasoline and other flammable liquids shall be stored in and dispensed from safety containers approved by the Engineer and storage shall not be within building.

Torch-cutting and welding operations performed by the Contractor shall have the approval of the Engineer before such work is started and a chemical extinguisher is to be available at the location where such work is in progress.

The Contractor shall follow the instructions and specifications of the Civil Defense Department or any other local department concerned with such activities.

27 CONSTRUCTION SCHEDULE

A Construction schedule shall be maintained in accordance with the provisions of the General Conditions of Contract.

The schedule shall be accompanied with sufficient data and information including all necessary particulars of constructional plant, equipment machinery, temporary Works, arrival of plant, equipment at site and their installation, method of operation, work forces employed, etc , for an activities of the Works.

Should the Engineer consider any alteration or addition in the programme and time schedule, the Contractor shall conform thereto without any cost to the Employer.

Whenever necessary and wherever the progress of the actual work shows departure, the programme and time schedule shall be undated and submitted to the Engineer for his approval.

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28 SUBMISSION REQUIREMENTS

28.1 Schedule submission at least sixty days before the dates when reviewed submittals will be needed.

28.2 Submit Shop Drawings as per provision given in Sub-Clause 23.6.2 and number of copies of Product Data which the Contractor requires for distribution plus four copies which will be retained by the Engineer.

28.3 Submit three samples unless otherwise specified.

28.4 Accompany submittals with transmittal letter, in duplicate, containing:

- Date.
- Project title and number.
- Contractor's name and address.
- The number of each Shop Drawing, Product Data and the Sample submitted.
- Notification of deviations from Contract Documents.
- Other pertinent data.

29 RESUBMISSION REQUIREMENTS

Shop Drawings:

- Revise initial drawings as required and resubmit as specified for initial submittal.
- Indicate on drawings any changes which have been made by the Engineer.
- Product Data and Samples: Submit new data and samples as required for initial submittal.

30 MONTHLY PROGRESS REPORT AND PHTOGRAPHS

30.1 During the continuance of the Contract, the Contractor shall submit monthly progress on forms as approved by the Engineer. Such weekly reports shall show the actual progress completed as of date of the report plotted against the schedule as given by the Contractor at the start of work and shall be broken down so as to indicate status of all activities associated with mobilization, design, material procurement, manufacture, surveys works, tests with regard to the agreed contract programme.

30.2 The Employer and the Engineer reserve the right to coordinate the schedules of this Contractor and other Contractors working at the Site, and to adjust and/or change any and all such schedules as required during the course of construction in order to achieve a coordinated project in harmony with the Employer's completion date.

30.3 Commencing after the first week of construction, and continuing every week until completion, the Contractor shall take and submit photographs to the Engineer's Representative, to show progress of his work and completion of each structure or major feature.

31 CONTRACTOR TO NOTIFY DELAYS ETC.

Any delay which will affect the completion of Works shall be detailed by the Contractor who shall state the action he is taking for effective completion of the Contract programme.

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The Contractor shall submit a report in respect of the various sections of the Works, the equipment in use or held in readiness, a return of labour and supervisory staff, and details of any matters arising which may generally affect the progress of the work.

The Contractor shall give a summary of the detailed progress report giving the position with regard to the agreed Contract programme.

The progress reports shall be set out in a format to the approval of the Engineer, and forwarded promptly so that on receipt the information contained therein is not more than 21 days out of date.

If during execution of the Contract, the Employer considers the progress position of any section of the work to be unsatisfactory, or for any other reason relating to the Contract, he will be at liberty to convene a meeting and the Contractor's Representatives are to attend such meeting.

The Contractor's Site Office shall prepare and submit 6 copies of a weekly progress report to the Employer and Engineer's Site Office. This report shall summarize site activities and record and details where difficulties in maintaining the agreed programme are being experienced or are likely to cause subsequent delay.

The Contractor's Site Office shall also prepare and submit to the Engineer's Site Office 2 copies of Daily Activity Report summarizing the main activities to be undertaken each day, noting special activities such as tests, alignment checks etc. The Contractor shall be responsible for expediting the delivery of all material and equipment to be provided by him and his subcontractors.

32 PHOTOGRAPHS

As soon as work commences on Site, the Contractor shall provide at least 10 to 12 photographs (alongwith soft copy) of the works from positions to be selected by the Engineer. Each photographic print shall not be less than 297mm x 210mm and shall bear a printed description, a serial number and the date when taken.

The negatives/soft copy of all photographs shall be held at the Contractor's Site Office, numbered and handed over to the Employer at the completion of the Contract.

33 Sign Board

The Contractor shall erect and maintain at the Site in a location to be approved by the Engineer two (2) Sign Boards of dimensions approved by the Engineer. The Sign Boards shall be made of metal. It shall be mounted on steel posts securely anchored and braced. The Contractor shall paint on the Sign Boards, the name of the Works, and the names of the Employer, Engineer and the Contractor both in English and Urdu Language.

34 Site Office for Engineer/Engineer's Staff

The Contractor shall construct, provide, furnish and maintain for Engineer, a site office as per design provided in these documents along with stabilized access road.

The Contractor shall provide a direct telephone with internet connection for the Engineer at site up-to an average billing of Rs. 4,000/- per month, one (01) computer (Core I-7, minimum with 500 GB Hard disk, 8 Gb Ram, a DVD writer, 17" Flat Colour monitor, etc.), one flash drive of at-least 8 GB capacity each, an A3 size colour printer, stationery & pantry, a digital camera (12.5 pixel minimum), UPS, stabilizers, air conditioners, 6 cubic feet refrigerators, etc., and the site office shall be connected to the electrical system, potable water supply system and sewage disposal system.

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The Contractor shall also provide 2-No Laptops core I7 (11th generation) for the exclusive use of the Employer/ Employer's Staff.

The Contractor shall provide replacement of the equipment(s), if any of the above-mentioned equipment(s) is temporarily or permanently rendered unserviceable for any reason(s) or declared to be beyond repair by the Engineer/Engineer's staff at no additional cost to the Employer.

The said offices shall be provided by the Contractor within twenty-eight (28) days of the receipt by the Contractor of Engineer's Notice to Commence or twenty-one (21) days of the payment of the first half of the Mobilization Advance, whichever earlier.

The site office shall be maintained by the Contractor up to a period of three hundred sixty four (364) days after the Issuance of Taking Over Certificate (DLP Period) by the Engineer.

The site office along with all fittings, fixtures and gadgets shall become property of the Employer after the completion of the project and shall be handed over to the Employer along with list of all items given for the use of Engineer. The site office shall be removed /dismantled if directed by the Engineer/Employer. In such case, the area shall be developed in accordance with the drawings or to its natural state and as per the instructions of the Engineer.

No payment shall be made to the Contractor for the works involved under this Sub-Clause.

35 Transport for The Engineer/ Employer

The Contractor shall provide, 1000CC air-conditioned Car for the pick and drop services of the Engineer/ Employer site staff to meet the transportation needs for the entire duration of actual construction period as well as for the duration of one month after substantial completion of project. The Contractor shall be wholly responsible for providing at all times satisfactory operating services including POL, lubricants, maintenance cost etc. for the Engineer.

In case of failure of provision of conveyance by the Contractor, the cost of alternate arrangements made by the Engineer/ Employer at his own cost shall be recovered from the Contractor's IPC as per actual.

No separate payment shall be made to the Contractor for the facilities involved under this clause. The cost thereof shall be deemed to have been included in the price quoted by the Contractor for the works.

36 Coordination of Work at Site

The Contractor shall take cognizance that during the execution of the project, other Contractor will be working concurrently on this Site.

All works of his responsibility shall be coordinated by the Contractor so as to give the necessary facilities to other Contractor or their workman or any other employ, who execute or supervise any work on the Site.
The Contractor shall ensure that the necessary safety precaution will be observed and interferences shall be avoided specially for the works executed side by side by different Contractors.

Due consideration must be given to permit access to sections of the work as required by other Contractors for the extension of their works. With a view to coordinate the works, the Engineer may from time to time direct the order of the works to be carried out.

No payment shall be made to the Contractor for the works involved under this sub clause.

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37 Site Facilities to Be Provided By The Contractor

37.6.1 General

Without prejudice to the generality of the various clauses of the Contract, particular attention is drawn to the obligation of the Contractor to make his own arrangement at his own expense for the following

37.6.2 Labour Camps and Staff Residences

The Contractor shall provide, operate and maintain labour camps and staff residences and are required for the proper and efficient progress of the work to house his own employees. For the purposes of operation and maintenance of the Camps and Residences, the Contractor shall comply with the rules of Pakistan Labour Camp Rules 1960 and all other applicable provisions of the Pakistan Labour Laws.

37.6.3 Administrative and Field Office

The Contractor shall provide, operate and maintain administrative and field offices required for his staff and would be responsible for Operation and Maintenance, furniture, equipment, appliances, janitor services and security of the same.

37.6.4 Work yards and Storage Areas

The Contractor shall provide, operate and maintain all sheds, fencing, foundations and all above ground structures required to store material or equipment brought on to the site by him. The Contractor shall be responsible for the security of his entire camps, residence, site and field offices work yard and storage area.

37.6.5 Water Supply, Sewerage System and Electricity

The Contractor shall make his own arrangement, at his own expense for provision, operation and maintenance of electric supply, reasonable supplies of raw and potable water and sewerage system at the site of works and his labour camps, staff residences and offices. The Contractor shall pay all fees, and charges (including bills) of whatsoever nature to the concerned departments (if any) in order to procure connections of the above facilities and thereafter using these facilities.

37.6.6 Medical Care

The Contractor shall arrange provision of adequate medical facilities for his employees.

Adequately equipped and properly staffed first aid stations or dispensaries shall be provided by the Contractor at camps and other strategic locations, to administer first aid treatment at all times free of charge to all persons on the Site, including personnel of the Engineer and the Employer. The nature, number and location of facilities furnished and the Contractor's staff for administering first-aid treatment shall meet the requirements of the Health Services of the Government of Pakistan and of Section III of the Manual "Safety Requirements for Construction by Contract", published by the Employer, and shall be subject to approval by the Engineer.

37.6.7 Other Facilities

The Contractor shall also be responsible for providing at his own cost other facilities for his own staff and labour such as educational, recreational, transport, telephone and catering if required.

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38. CONSTRUCTION PROCEDURES

The Contractor shall advise the Engineer of proposed construction procedures in accordance with the General Conditions of Contract.

If the Engineer shall see that the work progress is slow in such a way that the work will not be completed in the time specified, then he shall order the Contractor to work overtime or in more shifts and the Contractor shall obey these orders without any additional payments and without any objections or request for compensation.

39. NOTIFICATION TO ENGINEER

The Engineer shall be notified daily in writing of the nature and location of the Works the Contractor intends to perform the next day so as to enable necessary inspection and measurement to be carried out. The Engineer may, if necessary, direct that longer notice be given of certain operations.

40. NIGHT WORK

When work is done at night the Contractor shall maintain from sunset to sunrise such lights on or about his work and plant as the Engineer may deem necessary for the proper observations of the work and the efficient execution thereof.

41. WEATHER

No work is to be undertaken when, in the opinion of the Engineer, the weather is so unsuitable that proper protection of the work cannot be ensured.

42. CO-ORDINATION WITH OTHER CONTRACTORS

It shall be the responsibility of the Contractor to keep-up good relations with other Contractors employed on site by the Employer. The Contractor shall cooperate and coordinate his work with that of the other Contractors working at the Site, to whatever extent may be necessary to complete the Project in accordance with the approved programme of the Works and in accordance with the Engineer's instructions. Should a disagreement or dispute arise between the Contractor and other contractors, the same shall be referred without delay to the Engineer for his decision. Upon such decision, the Contractor shall proceed with the work in accordance therewith. In case the access to the works of other contractors is through the Site area of the Contractor, the Contractor shall coordinate with and permit all reasonable access to other Contractors.

43. ACCIDENT PREVENTION, SAFETY MEASURES AND PROTECTIVE EQUIPMENT

The Contractor shall comply and enforce compliance by all his sub- contractors with the highest standards of safety and accident prevention in accordance with international standards and in compliance with all applicable laws, ordinances and statutory provisions.

All requisite barriers, fences, warning signs, lights and other safety precautions as required for the protection of persons and property on or adjacent to the site shall be provided at the Contractor's cost.

All false work, scaffolding and handrails shall be well constructed and secured at all times. Where overhead work is being carried out, warning signs shall be installed at ground level clearly warning of the overhead work.

All warning signs shall be in two languages, English and Urdu, and shall at all times be maintained in a clean and legible condition, to the satisfaction of the Engineer.

Trash shall be removed at frequent intervals to the satisfaction of the Engineer.

Netting shall be provided at all levels where work is in progress, all around the building.

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44. SETTING OUT OF WORK AND SURVEY

44.1 Reference Points, Lines

The Contractor shall establish benchmarks and / or reference line at the Site in accordance with the instructions of the Engineer. The Contractor shall set out its work from these benchmarks and lines. The Contractor shall supply plant, equipment, materials and labour for checking if required of the survey control by the Engineer. Slope stakes will be set by the Contractor before commencement of excavation and will be re-established as required during progress of work using established bench-marks and reference points.

44.2 Verification

The Engineer may make checks as the work progress to verify lines and grades established by the Contractor and to determine the conformance of the work as it progresses with the requirements of the Drawings and Specifications. Such checking by the Engineer shall not relieve the Contractor of his responsibility to perform all work in accordance with the Drawings and Specifications and the lines and grades given therein.

Based upon the basic control, the Contractor shall provide his own primary control points, as needed for the Works, and shall preserve and maintain them until otherwise authorized.

The Contractor shall be responsible for maintaining all survey markers/monuments, and property corners. If any markers/monuments are destroyed by the Contractor, the Contractor shall arrange, at his own cost, to retrace and replace them to the entire satisfaction of the Engineer. If a monument cannot be replaced in its original position, the Contractor shall install a witness corner. The Contractor shall complete and file monument reference cards on all monuments as per instructions of the Engineer.

The Contractor shall provide experienced construction surveyors with adequate experience in the construction surveys similar in nature as required by this Contract.

Based upon established basic control monuments the Contractor shall establish all lines and grades necessary to control the Works, and shall be responsible for all measurements that may be required for execution of the Works to the tolerance prescribed below.

The Contractor shall perform such surveys and computations as are necessary to determine quantities of work performed or placed during each progress payment period, and shall also perform all surveys necessary for the Engineer to determine final quantities of work in place. The Engineer will determine final quantities based on original ground levels determined by the Contractor and agreed by the Engineer.

The Contractor shall notify the Engineer at least 24 hours before performing a quantity survey and, unless specifically waived, quantity surveys shall be performed in the presence of an authorized representative of the Engineer.

Degree of accuracy for the survey works shall satisfy the following specified tolerances.

(a) Structure points shall be set within 0.01 foot accuracy from point to point, except where tighter tolerances are required.

(b) Cross-section points shall be located within 0.10 foot, horizontally and 0.01 foot vertically.

(c) Permissible closing error for a levelling line meant for establishing Temporary Bench Mark (TBMs) shall not exceed $0.045 \times \sqrt{M}$ foot, where M is in miles. The permissible closing error shall be duly adjusted.

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The Contractor shall provide all materials, equipment and labour required for surveying work, including, but not limited to, instruments, stakes, spikes, steel pins, templates, platforms, and tools, and except as required to be incorporated in the work or left in place, all such materials and equipment, shall remain the property of the Contractor. Surveying instruments shall be in perfect working condition and shall be subject to rigid inspection for proper operation at least after every two weeks of use. Defective instruments shall be promptly replaced or repaired and adjusted to the satisfaction of the Engineer.

Survey data shall be recorded in accordance with recognized professional surveying standards. Original field notes, computations, and other surveying data shall be recorded in the Contractor furnished field books. Notes or data not in accordance with standard formats will be rejected. Illegible notes or data, or use of erasures on any page of a field book will be considered sufficient cause for rejection of part or the entire field book. Copied notes or data will not be permitted, therefore, rejection of part or all of a field book may necessitate re-surveying. Corrections by ruling or lining out errors will be satisfactory.

The cost of all materials, equipment, surveyors and labour required for surveys for the Works and quantity surveys required by this clause shall be deemed to be included in the rates and prices of the various items in the Bill of Quantities and no separate measurement and payment in their respect shall be made.

44.3 Survey Instruments

The Contractor shall maintain at the Site the requisite surveying instruments in perfect working conditions to enable the Engineer's Representative to check levels and lines of the work at all times.

45. PAYMENT OF WORK

No payment shall be made for the works involved within the scope of this section of specification unless otherwise specifically stated in the Bills of Quantities or herein.

The cost thereof shall be deemed to have been included in the total price quoted by the Contractor.

46. ENVIRONMENTAL PROTECTION

The Contractor shall exercise care to protect the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of works. Except where clearing is required for the Permanent works, approved construction roads and the Temporary Works, and for excavation operations, all trees and native vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's construction operations and equipment. On completion of the works, all work areas shall be smoothed and graded in a manner to confirm to the natural appearance of the landscape. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operations, it shall be repaired, replanted, or otherwise corrected as directed by the Engineer at no additional cost to the Employer.

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SPECIFICATIONS

SPECIFIC PROVISIONS (HVAC)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SPECIAL PROVISIONS

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PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

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SPECIAL PROVISIONS

SP-01 GENERAL

SP-01.1 Location of Project

The HVAC system shall be installed in the Academic Building of Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad.

SP-01.2 Building for the Project

The HVAC Contractor shall be responsible to intimate to Engineer any omission during civil construction with respect to provisions of space, openings in walls, floors, roof slabs, false ceilings, drain points and electrical requirements for HVAC Works.

The Contractor is advised to study architectural, structural, electrical and plumbing System to familiarize himself with the Building Plans/Layout.

SP-01.3 Use of Building

The building comprises of seven (07) storeys (BF+GF+5F) which comprises of following facilities:

- Offices
- Lecture Theaters/classrooms/Examination Halls
- Board Room
- Microbiology Lab
- Molecular Biology and Genetics Lab
- Pharmacology and Pharmacology Lab
- Physiology Lab
- Mock Operation Theater/OBGYN
- Anatomy Lab
- Biochemistry Lab
- Pathology Lab
- Infectious Diseases Lab
- Cafeteria
- Mosque
- Library

Toilets are located in each floor of buildings

SP-01.4 HVAC System Concept

a) Type of System:

Unitary System with Variable Refrigerant Flow (VRF) reversible (heat pump type) air conditioning system has been adopted for this project. Same HVAC system shall be used for cooling and heating in summer and winter season respectively as per requirement. The conditioned fresh air in all the areas shall be provided through treated fresh air units.

However, for Laboratories, Dx-type Air Handling Units (AHUs) with matching Condensing Units (Reversible Type) are provided to keep the hygienic conditions.

b) Plant Operation during Power Failures

As the cooling/heating will be required continuously during power break down or load shedding so all HVAC equipment shall be connected to emergency power.

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SP-01.5 Service Conditions for Auxiliaries

a) Power Supply

Electrical Circuit Voltages:
Nominal, 3-Phase: 415 volts
1-Phase: 240 volts
Frequency: 50 Hz

For equipment ratings:
3-Phase: 400 volts
1-Phase: 230 volts
Frequency: 50 Hz

b) Water Supply will be available in all air handling unit rooms.

b) Floor drains will be connected to floor drain system of the Building.

SP-01.6 Units

The units used in these specifications are as under:

Unit System:	SI/British/FPS
Gauge:	US Gauges as per ASTM
TR:	Tons of Refrigeration equivalent to 12000 BTU/H (12 MBH) or 3516 W

SP-02 WORK BY THE CONTRACTOR

SP-02.1 Scope of Work

a) The work under this Contract comprises of all HVAC works including supply, installation, balancing, testing, commissioning, and operation & maintenance (O&M) during defects liability period.

b) The Contractor shall furnish all labor, materials, equipment tools, appurtenances, services, temporary work and storage necessary to completely supply, install, test, commission, and operate & maintain the HVAC system, all in the perfect operating conditions in accordance with these Specifications and Drawings. The Contractor shall also test, adjust, balance, re-adjust all the air and water systems as specified and shown. The Contractor shall commission, operate and maintain all the systems for a period specified in Clause SP-22 under Defects Liability Period.

c) The complete civil work as mentioned in schedule of prices and any relevant civil work required to complete the job is included in Contractor's scope of work.

d) The Contractor shall plan and coordinate his activities and schedules so as not to interfere with the work of other Contractors. Also, interference with other building associated work shall be totally avoided and Contractor shall prepare the schedule of work accordingly. It shall also be his responsibility to maintain the facility constructed by him till the end of the Contract period.

Any problem of interface with other Contractor(s), associated proceedings shall be brought to the notice of the Engineer/ Employer whose decision in this respect shall be final and binding on all parties.

The Contractor shall inform for the schedule of any construction activity well in advance.

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If any part of the work is damaged or has to dismantle or redone due to negligence/omission/incorrect position of the embedment etc. as part of the Contractor, all such loses/expenses shall be borne by the Contractor.

e) The Specifications are only general guidelines and by no means cover details of each equipment. These only spell out the intent of the requirement. The details have to be provided by the Contractor along with details of performance, construction and technical literature with the Bid. The specifications are to be read in conjunction with the Drawings.

All equipment and materials shall be brand new bearing stamped ratings as required by Equipment Schedules and must be approved by the Engineer prior to their use. Any doubts about the practicability and implementation of Specifications and details shown in the Drawings must be expressed along with submission of Bid. Inability of the Contractor to implement these specifications after the acceptance of the Contract shall be considered breach of Contract.

SP-02.2 Services by the Contractor

a) Erection Supervisor

The Contractor shall provide competent Erection Supervisor to direct and be responsible for the erection, starting and operation of the Equipment supplied by the Contractor until issuance of Substantial Completion Certificate. Further details concerning Erection Supervisor are covered in Clause SP-17, "Erection Supervisors and Operating Staff". In addition, the Contractor shall also provide services of Factory Engineer authorized by manufacturer to direct and supervise the installation, testing & commissioning.

b) Operation & Maintenance Period

The Contractor shall operate, service and maintain HVAC system for a period mentioned in and as per requirements of Clause SP-22, "Operation & Maintenance Period". The Contractor shall provide all personnel for operation and maintenance including one Supervisor. Qualifications, experience and number of all these personnel shall be subject to the Engineer's approval.

c) Training of Employer's Operative Personnel.

The Contractor shall arrange free of cost on-site training of operative personnel, nominated by the Employer, in the operations and maintenance of all HVAC equipment and system. The period of training shall not be less than fifteen (15) days.

The training shall be delivered by a qualified personal having at least seven (07) years' experience in the operation and maintenance of similar HVAC systems.

The Trainer shall fully orient the group with the actual system and impart thorough training in the operations and maintenance of the system and equipment with the help of drawings, charts, hand-outs, diagrams, video aids, lectures, etc. Details and time of training shall be approved by the Employer/Engineer before training is commenced.

SP-02.3 Erection Plant

Under this clause the Contractor shall provide erection plant and tools for his own use during erection period only; he would take back these tools on completion.

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Tools for maintenance after completion are to be provided under Clause TP-10-05.

The Contractor shall furnish special erection plant and tools in accordance with the requirements of Clause SP-15, "Fabrication, Erection Testing and Maintenance Tools Plant and Instruments.

SP-02.4 Related Works

The Contractor shall provide all works related to HVAC system, but not be limited to:

a) Power supply and earthing shall be provided by the Employer and incoming power feeders and earth continuity conductors shall be terminated at locations as shown on the Drawings and/or as stated in the Technical Provisions, Section 6, Electrical Equipment and Controls. All electrical works from these points onward shall be the responsibility of the Contractor.

b) All works related to water and cooling coil condensate disposal from HVAC system upto nearest floor drains shall be the responsibility of the Contractor.

c) Insulation work as per specifications of the Project.

d) Cutting, patching and repairing in accordance with Section 1.0 of the Technical Provisions.

e) Providing written information regarding location and sizes of door louvers, where required, to the persons responsible for door louvers, through the Engineer. This information shall be provided within thirty (30) days of issue of the Engineer's Order to Commence Work.

f) All wood-work required for satisfactory completion of the project as specified except decorative wood work provided to conceal HVAC equipment.

g) Providing shop drawings at scale (1:50) and other written information regarding Concrete Pads and foundations for HVAC equipment to the Civil Contractor through the Engineer. Catalogue cuts showing foundation details will not be accepted.

h) Providing steel frames for inertia pads and cork sheet/neoprene sheet for other pad.

i) All foundations for HVAC equipment including concrete foundations, housekeeping pads and concreting for inertia pads (where required) shall be provided by the HVAC Contractor.

j) Coordinating HVAC installation with other trades work, by way of study of other trades drawings and pointing out the areas of conflict to the Engineer before installing items of HVAC system.

SP-03 WORK NOT INCLUDED

Not Used.

SP-04 DESIGN CONDITIONS

HVAC System has been designed with conditions listed hereunder.

SP-04.1 Outside Design Conditions

a) Summer Dry Bulb Temp. (Max.) 111 °F

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c) Concident Wet Bulb Temp. (Max.) 83 °F

d) Daily range. (Max.) 24 °F

e) Winter Dry Bulb Temp. 33 °F

f) Wind Velocity.

- Summer 10 MPH
- Winter 15 MPH

g) Climate. Tropical with dust storms in April-May-June and torrential Rains in July - August - September.

i) Latitude. 33 Degrees North
ii) Longitude 73 Degrees East
iii) Elevation 1940 ft

SP-04.2 Inside Design Conditions

Category	Inside Design Temperature (°F)		Sound Levels (NC)	Humidity (RH) %
	Summer	Winter		
Class Rooms/Lecture Theaters/Examination Halls/Offices/Libraries	73 to 79	68.5 to 74.5	25 to 30	50% 60
Cafeteria	78.5	70 to 73.5	30 to 45	30 to 60
Microbiology	70 to 75		25 to 30	30 to 50
Biochemistry	70 to 75		25 to 30	30 to 50
Pathology	70 to 75		25 to 30	30 to 50
Pharmacology Lab	70 to 75		25 to 30	30 to 50
Anatomy and Physiology Lab	70 to 75		25 to 30	30 to 50
Molecular and Genetics Lab	70 to 75		25 to 30	30 to 50
Mosque	74 to 78		30 to 35	50 to 60

SP-04.3 Air Filtration

Air filtration based on ANSI/ASHRAE Filter Test Standards 52.2-2017, "Atmospheric Dust Spot Efficiency". Filter efficiencies are stated in AHU Equipment Schedules.

SP-05 DRAWINGS, EQUIPMENT SUBMITTALS, INFORMATION MANUALS, SAMPLES & CONTRACTOR'S OTHER SUBMISSIONS

SP-05.1 General

All drawings, other information and samples must be supplied to the Engineer as laid down in these Specifications and as and when agreed during site meetings, in the Progress Chart or as instructed by the Engineer.

The Contractor shall submit, for approval, detailed submittals as specified and no material or equipment may be delivered to the site or installed until the Contractor has in his possession with the approved Data Sheet, Catalogue cuts or samples of particular material. Approval rendered on submittals shall not be considered as a guarantee of measurements or building conditions.

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Where submittals are approved, said approval does not in any way relieve the Contractor from his responsibility for necessity of furnishing material or performing work as required by the Drawings and Specifications.

Failure of the Contractor in providing submittals in ample time for checking shall not entitle him to an extension of the Contract time and no claim for extension by reason of such default will be allowed.

SP-05.2 Omitted Particulars

All works and matters omitted from the Contract but which may reasonably be implied or inferred from them and in the opinion of the Engineer obviously are necessary for the efficiency, stability, completion and maintenance of the works and which are ordered by the Engineer to be carried out shall be executed by the Contractor accordingly as if they had been expressively described in or shown on the Contract documents and the costs thereof shall be deemed to be included in and covered by the Contract Price.

SP-05.3 Drawings

The Bidding Drawings show the Scope of Work to be performed by the Contractor. These Drawings shall not be used as a basis for fabrication, construction or installation but shall be used for estimation for bidding purpose only. These drawings are not to be considered defining the design of HVAC equipment to be furnished or defining the exact details of the installation under this Contract, but are only illustrative of the Specifications and HVAC System and show the general layout of the equipment forming part of HVAC System and schematic diagrams explaining the system flow, controls and sequence of operation. These drawings are not to be scaled.

These Drawings do not show every offset, bend or elbow which may be required in the piping or ductwork for installation in the space provided. The routes and sizes (if shown) of ductwork, piping, air inlets and outlets shown on these Drawings are subject to change depending upon the make of major HVAC equipment to be provided by the Contractor. These design parameters shall be adjusted at the shop drawing stage.

Work shown on the HVAC Drawings and not mentioned in the Specifications, or described in the Specifications without being shown on the HVAC Drawings, shall nevertheless be held to be included in the contract in the same manner as if they had been specifically shown upon the Drawings and described in the Specifications.

SP-05.4 Drawings Supplied by Engineer

The Engineer may supply to the Contractor after signing the contract working drawings/detail drawings and instructions as may be necessary for preparing shop drawings and for the guidance of the Contractor in the construction, completion and maintenance of the works, and the Contractor shall execute, obey and be bound by the same.

The Contractor shall not be entitled to any payment in addition to the Contract Price in respect of any work shown or directed to be done by such working/detail drawings or instructions unless the Engineer shall have given and approved a variation order for the same.

Any additional drawings found necessary or desirable by the Contractor to show different combinations of drawings supplied by the Engineer shall be prepared by the Contractor at his own expense. The Contractor shall carefully check all drawings and inform the Engineer of any errors or omissions discovered. The Contractor shall be furnished with one copy of all detail drawings and graphic instructions prepared by the Engineer. Additional copies, within reasonable quantity, will be furnished to the Contractor, upon request, at cost.

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The Contractor shall be furnished with one copy of all textual instructions as may be issued by the Engineer.

SP-05.5 Shop Drawings

The Contractor shall make detailed analysis of the requirements of the works. Based upon such analysis and working drawings supplied by the Engineer, he shall revise and amplify the Drawings and shall prepare detailed Shop Drawings at his own cost for complete HVAC System and Equipment. Initially he shall submit 3 preliminary copies each of all such Shop Drawings to the Engineer for obtaining approval. Once basic agreement is reached with the Engineer regarding the details then the Contractor shall submit 3 copies each of all such Shop Drawings and one copy to the Engineer for obtaining approval of the Engineer. After obtaining approval and after having in possession these approved Shop Drawings, the Contractor shall use these Shop Drawings for fabrication, construction and installation.

The work described on any shop drawing submitted shall carefully be checked by the Contractor for all clearances, field conditions, maintenance of architectural conditions and proper coordination with all trades on the job. To this end, the Contractor during the shop drawing stage, shall ensure that he receives drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between trades shall be referred to the Engineer for decision.

Equipment layout is to be detailed on shop drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

The Contractor shall submit shop drawings of all sheet metal work for approval, before work is fabricated and installed. Ductwork drawings must show clearances between ductwork and masonry. All dampers, splitter dampers, fresh air inlets, exhaust air outlets, connections to equipment and methods of support and any other details necessary for the satisfactory installation of the system must be indicated. Each type of grill, register, diffuser and louver is to be referenced in a schedule and the type and size clearly indicated at each location. Taper and flat sides of ductwork at all transitions must be indicated, and all equipment piping and ductwork must be located exactly by showing exact dimensions with column lines or other reference lines.

Duct bottom height from finished floor level shall be marked with every change in level.

Position of hangers and supports with type and method of installation of each hanger shall be given, detailing the type of hanger fixing with a reference number for each type.

Piping drawings must be fully detailed, showing all piping in double line and indicating the precise size of fittings, valves and equipment. Positions of hangers and supports with reference numbers must be given showing the type and method of installation of each hanger detailing the type of hanger fixings with a reference number for each type.

All general layout drawings shall be drawn to 1:50 (1" 1/4") scale. Details of hangers, methods of fixing of pipes and ducts, detailed cross section of pipe, ducts and risers, details of control and piping hook-ups to equipment shall be drawn to 1:10 (1" 1") scale.

The Contractor shall prepare Drawings and Schedules showing precise details of holes in concrete, masonry, etc. and necessary sleeves required for passage of ducts and fitting of grills, registers, diffusers, louvers, equipment supports etc. Drawings and Schedules, approved by the Engineer must be available before any structural work requiring holes or other modifications, is constructed.

Signed and approved drawings shall not be departed from unless a signed variation order or site instruction is issued in writing by the Engineer. Drawings returned to the Contractor for alteration or amendments are to be resubmitted for approval.

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Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with revision number or letter and the date of the revision.

The Contractor shall be responsible for any discrepancies, errors or omissions in the drawings and other particulars supplied by him whether such drawings and particulars have been approved by the Engineer or not, provided that such discrepancies, errors, or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by the Engineer.

SP-05.6 As-Built Drawings

The Contractor shall supply to the Engineer a set of "As-Built" drawings showing the Contract works as installed, together with any other information necessary for operation and maintenance. Three copies of each drawing (scale as per shop drawing) and other information shall be supplied, along with a reproducible and a soft copy.

SP-05.7 Manufacturer's Data

Manufacturer's performance data, certified factory drawings and/or curves of apparatus giving full information as to capacity, performance at different operating and ambient conditions, dimensions, materials, electrical data and all information pertinent to the adequacy of the submitted equipment shall be submitted for approval. One original and 2 copies of catalogues and other information shall be submitted.

Manufacturer's names, sizes, catalogue numbers and/ or samples of all materials shall also be submitted for approval.

Orders for equipment submitted for approval must be accompanied by relevant drawings, curves, technical data, catalogues and samples. Where data, certified drawings or other required information is not available until after orders have been placed, the Engineer shall give provisional approval until all requested drawings and information have been supplied to the Engineer and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Engineer in accordance with the progress of works.

Should the Engineer give provisional approval only for an order due to lack of complete information and should the missing information not eventually meet with the approval, the Engineer shall not be held responsible for any delay incurred. For equipment where information from the manufacturers is likely to be delayed, it is essential that the Contractor places provisionally approved orders at the earliest possible date so as to ensure approval of orders in complete conformity with the progress of the works.

Submittals and shop drawings should, as far as possible, be complementary so that drawings and submittals can be cross-checked.

SP-05.8 Samples

Contractor shall provide at his cost, samples of materials, instruments, gauges and electrical items, for approval by the Engineer before order is placed for the same. Engineer may waive this requirement, if detailed published catalogues submitted by the Contractor provide sufficient information for approval. These samples shall include, but not limited to:

i) G.I. Sheet
ii) Copper Pipes and fittings
iii) Duct and Pipe insulation and covering
iv) Insulation adhesive and tapes
v) AI/AO Diffusers and OA/EA louvers

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vi) Power and control cables
vii) Electrical items; push buttons, HOA & toggle switches, pilot lamp, contactor, relays, circuit breakers and isolating switches
viii) Vibration isolating springs.
ix) Duct and pipe hangers and rollers
x) Electrical conduits and fittings
xi) Paints
xii) Anchor bolts, studs, etc. for hanging arrangements
xiii) Any other item required by the Engineer

SP-05.9 Copies of Drawings and Specifications

One set of Bidding Documents and one (01) sets of Drawings will be issued by the Employer to the Contractor free of cost after award of Contract. Additional sets will be provided at cost upon written request to the Engineer by the Contractor.

SP-05.10 Sound Absorption Data

The Contractor shall provide data for sound absorption from HVAC equipment, air terminals etc. to ensure NC ratings as specified in SP-04.2.

SP-05.11 Photographs and Progress Reports

The Contractor shall arrange, at his cost, color photographs of Works in progress at Site. At least six photographs per month shall be taken from approved locations, commencing with the first month up to the completion of the Works. A professional camera shall be used. The Contractor shall submit, not later than seventh of each month, a negative and six prints of 10x8 inch of each photograph taken during the previous month, with a brief report indicating progress of Works to date.

SP-06 APPROVAL OF MATERIALS AND EQUIPMENT

As soon as practicable after the award of Contract, the Contractor shall submit for the approval of the Engineer specifications, drawings, catalogue - cuts, diagrams and other descriptive data for all materials, components and equipment which the Contractor proposes for use under this Contract. For certain materials and equipment, data may be required to be submitted in accordance with a detailed form furnished by the Engineer. Items submitted shall be properly labeled to indicate the Contract number, project, manufacturer, source of supply, Contract Item number, and other data required by the Specifications. All items shall be submitted in sufficient time to permit proper consideration and action thereon without delaying the construction schedule. These data shall include original copies of proforma invoices for placing orders, a type written specification sheet of each SOR item, and technical literature (complete bound published catalogue) with relevant portions highlighted by a marker. Accessories to be included shall clearly be marked in catalogue and indicated in specification sheet.

SP-07 TIME FOR DELIVERY

All equipment plant and machinery shall be delivered at Site on such dates so as to ensure adherence to scheduled dates stated in Programs of works submitted by the Contractor and approved by the Engineer subsequent to the award of contract. The Contractor shall keep the Engineer informed of the progress of the shipment and notify them approximately 3 weeks in advance, in writing, as to when the equipment will be ready for inspection at Site by the Engineer and shall supply lists covering each consignment in sufficient detail to enable Engineer to check the contents of the packages, if he so desires.

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SP-08 STANDARDS AND CODE REQUIREMENT

SP-08.1 All equipment and materials under HVAC Scope of Works shall be furnished in conformity with the latest edition of Applicable Standards of ASME, ASHRAE, ARI, SMACNA, TIMA, AMCA and applicable Government and Local Codes governing the same. In case of conflict, the strict requirements shown/specified shall govern. All equipment shall be rated and tested as per standards listed in ASHRAE Handbook (latest Edition).

SP-08.2 Abbreviations for Codes and Standards referred in the Contract are as under:

1) ASME - American Society of Mechanical Engineers
2) ASTM - American Society for Testing & Materials
3) ASHRAE - American Society of Heating, Refrigerating and Air-conditioning Engineers
4) NFPA - National Fire Protection Association, USA
5) AHRI - Air-conditioning and Refrigeration Institute, USA
6) SMACNA - Sheet Metal and Air-conditioning Contractors National Association, USA
7) CTI – Cooling Tower Institute
8) EUROVENT – European Committee of Ventilating Equipment Manufacturers
9) GOVERNMENT - Government of Pakistan
10) LOCAL - Local authorities of the city where the Project is located
11) I.E.E. - Institute of Electrical Engineers, London
12) NEMA - National Electrical Manufacturers Association, USA
13) AMCA - Air Moving and Control Association Inc., USA
14) P.S. - Pakistan Standards.
15) B.S. - British Standards.
16) TIMA - Thermal Insulation Manufacturer's Association, US

SP-09 STANDARDS OTHER THAN THOSE SPECIFIED

Where the specifications provide requirements for material or equipment by specifying a standard such as for example, one of the American Society of Heating, Refrigerating and Air Conditioning Engineers which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards, including standards of other countries, will be accepted provided the requirements thereof, in the sole opinion of the Engineer are atleast equal to the requirements of the standards specified. The Contractor may propose to the Engineer an equivalent standard other than that specified, in which case he shall submit the proposed standards and all other information to demonstrate and prove his proposed standard is equivalent in all significant respects to the standard specified. All submissions must be made in the English language.

SP-10 PERMIT

The Contractor shall secure and pay for any necessary approvals, permits and inspections from Government or other controlling agencies where applicable as required by law, before commencing any work so as to avoid all delays during erection and turn over the official records of granting of permits to the Engineer. No reimbursements shall be made for such payments.

SP-11 SHOP INSPECTION, DAMAGES AND MATERIAL ORDER

SP-11.1 Inspection

All major equipment to be supplied under this Contract which has been manufactured or shop-assembled in or outside Pakistan shall be subject to inspection (if the Employer so desires) by Employer or its authorized representative at its point of original manufacture or final shop assembly before its dispatch to SITE. The Contractor shall make necessary

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arrangements and provide all the facilities required for such inspection. The cost of travel, boarding and lodging of Employer, his authorized representative or the Engineer shall be the responsibility of the Contractor.

The following equipment shall be inspected and tested at the manufacturer's works/ authorized representative ware house:

1) Electrical Control Panels

SP-11.2 Material Orders

Triplicate copies of material or equipment orders required in this Contract shall be furnished to the Engineer. All orders shall state the specification designation under which the material is to be furnished and shall bear reference to the drawing number, if any, pertinent thereto. Orders shall also state that material is subject to inspection and testing and shall show the required date of delivery of the material to destination.

SP-11.3 Acceptance of Materials

The acceptance of any material or equipment prior to shipment shall in no way relieve the Contractor of any of his responsibilities for meeting all of the requirements of the specifications and shall not prevent subsequent rejection if such material or equipment is later found to be defective.

SP-11.4 Damages, During Transportation, Storage and Installation

The Contractor shall be responsible for any damage of the Equipment/ material during transportation to site, storage and until satisfactory handing over the works. The Contractor shall replace any damaged equipment/ materials at his own cost.

SP-12 NAMEPLATES

The Contractor shall provide and attach to each major piece of equipment, a metal name and rating plate to be approved by the Engineer, giving the name and address of the manufacturer, the date and rating data. All ratings shall be in the British system. Large lettering on any of the parts will not be permitted. All ratings shall be in the unit system adopted for the project, unless otherwise authorized by the Engineer.

SP-13 DIRECTED AND REQUIRED ETC.

Unless otherwise stated, wherever in the Specifications or upon the Drawings the words "directed", "required", "permitted", "ordered", "designated", "prescribed" or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended, and similarly the words "approved", "accepted", "satisfactory", or words of like import shall mean approved by, or acceptable or satisfactory to the Engineer unless otherwise indicated.

SP-14 SEQUENCE OF ERECTION

The sequence of erection of the Equipment shall conform to the requirements of the civil construction and of the Erection Instructions. Such information will be furnished to the Contractor by the Engineer upon request.

SP-15 FABRICATION, ERECTION, TESTING AND MAINTENANCE TOOLS PLANT & INSTRUMENTS

SP-15.1 The Contractor shall furnish special plant and tools for the complete and proper fabrication, erection and maintenance tools, plant & instruments of the HVAC Equipment. Tools shall include the type of tools not normally available in the market as standard tools and is generally manufactured especially for use with the HVAC Equipment. All

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lifting devices shall be accurately machined to fit the parts to be handled. The wrenches and tools for maintenance, insofar as practicable, shall be mounted on a suitable hardwood or steel board arranged for wall mounting and provided with means for ready identification. The Contractor shall also provide refrigerant charging Plant if and when required. No separate payment shall be made for providing Plant and Tools and the Contractor may withdraw the Plant and Tools after its use.

SP-15.2 The Contractor shall furnish and install sign board showing information about the project, name of Employer, Engineer and the Contractor, as directed by the Engineer.

SP-16 MATERIALS AND EQUIPMENT TO BE IMPORTED

Imported materials and equipment, whether procured from local market or imported especially for this project by the Contractor shall include, but not limited to the items listed hereunder. The Engineer may however issue a Variation later for use of locally fabricated item, if he is satisfied that specified requirements will be met.

a. DX - Type Air Handling Units with matching Condensing Units
b. Variable Refrigerant Flow (VRF) Air Conditioning units.
c. Copper Pipes, fittings and specialties.
d. Instruments and Gauges
e. Piping Expansion Joints and Flexible Connectors.
f. Vibration Isolators for Fans, VRF, etc., when specified as Imported.
g. Duct and Piping Insulation, Sound Liner, and Insulation Tape, Sealing Tape, Duct Sealer and Adhesive.
h. Electrical circuit breakers, contractors, relays, indications and measuring instrument, for electrical panel.

SP-17 ERECTION SUPERVISORS AND OPERATING STAFF

SP-17.1 General

The Contractor shall provide the services of Erection Supervisors and Operating Staff in accordance with the requirements of the Conditions of Contract, of sub-clause SP-02.2 Services by the Contractor, and as specified herein.

SP-17.2 Work by Erection Supervisor

a) The Erection Supervisor shall direct the activities of Contractor's employees as they concern the installation, commissioning balancing and testing of the Equipment furnished under this Contract. The Contractor through his Erection Supervisor shall cooperate with other Contractors to whatever extent is necessary to produce an installation satisfactory to the Engineer in accordance with the requirements of the time schedule, the Drawings and the Specifications.

b) Erection Supervisor shall be present from the Commencement of Work and remain on Site until the substantial completion.

c) Should a disagreement arise between other Contractors and the Erection Supervisor, the matter shall be submitted without delay to the Engineer for his decision. Upon such decision, the Erection Supervisor shall proceed with the work in accordance therewith, immediately.

d) Erection Supervisor shall be a three (03) year diploma holder from Government College of Technology in HVAC Technology having at least 7-8 years of experience in HVAC installation works of similar nature.

e) If the Contractor fails to fulfill his obligations under clause SP-02.2(a) and also fails to provide the Services of the Erection Supervisor having the minimum qualifications as stated in sub-clause (d) of this Clause then the Contractor

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would be obligated to pay to the Employer an amount of Rs.1500 per day for the number of days when the services of such Erection Supervisor are not provided. The Employer would be entitled to deduct the amount due from the Contractor in this regard from his running Bill/any payable sums.

f) Provision of (e) above shall not apply when the Erection Supervisor is on authorized legal leave (casual), sick leave and official holidays only. His absence up to a period of ten (10) days will also be allowed when the contractor intends to replace the Erection Supervisor with the consent of the Engineer.

SP-17.3 Operating Staff

The Contractor shall provide staff to operate, service and maintain the HVAC system continuously for eight (08) hours a day during one (01) year Defect Liability Period (DLP). Operating supervisor shall have at least seven (07) years' experience of similar works. The Contractor shall also arrange to provide proper training to Employer's staff to operate the HVAC system to the entire satisfaction of the Employer. All costs incidental to providing operating staff including staff salaries shall be deemed to be included in relevant item of Schedule of Prices. No separate payment shall be made to the Contractor for fulfillment of his obligations under this clause.

SP-18 RIGHT TO OPERATE PLANT

The Employer reserves the right to operate any and all Equipment after it has been Commissioned and prior to substantial completion of whole Works. All repairs or alterations found to be necessary during such operation, and required of the Contractor, shall be made by the Contractor at such time as directed by the Engineer. The repairs or alterations shall be made in such a manner and at such a time as will cause the minimum interruption in the use of the Equipment by the Employer.

SP-19 ERECTION INSTRUCTIONS

Erection Instructions in form of published installation manual, as furnished by the manufacturer of VRF Units and AHUs with matching Condensing Units shall be provided by the Contractor.

These instructions shall include full and detailed instructions for the guidance of the Erection Supervisor as to all procedures and precautions to be observed in erecting, assembling and adjusting the Equipment and as to the use of the Erection Plant. It shall include or be accompanied by drawings, clearly showing erection marking and particularly any matchmaking and shall embody in particular a full statement as to erection tolerances to be observed.

These shall also include full instructions for the maintenance of the Equipment not only during the period of Contractor's liability but more particularly during its operating life. The directions shall be set out simply, clearly and systematically. In particular, this section shall include a full list of all routine checks and their timing, directions as to fault finding, detail of all routine attentions (such as greasing), in the form of check sheets for daily, weekly, monthly, quarterly, half-yearly, yearly and any other periodic checks recommended by the manufacturer. This section should also provide detailed and complete instructions for trouble shooting, maintenance and all necessary adjustments to the Equipment. Technical leaflets and brochures in respect of all equipment supplied under this Contract including all relays, instruments, switches, controllers, regulators etc., should be supplied with the erection instruction. This should also include complete catalogue of spare parts with exploded views of the equipment and relevant part numbers to facilitate identification and ordering of spares throughout the operating life of the Equipment.

The Contractor shall submit 3 copies to the Engineer for approval.

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SP-20 WATER, POWER AND GAS DURING ERECTION AND TESTING

Water and power supply for Erection and Preliminary Tests shall be the responsibility of the Contractor. Water, power and gas supply for Balancing & Commissioning, Performance Tests and Reliability Trial Tests and operation during Defects Liability Period will be provided by the Employer.

SP-21 SPARE PARTS

The Contractor shall furnish spare parts as per list given in the Section 2 of Technical Provisions. The Contractor shall also furnish recommended spare parts with the recommendation of manufacturer of equipment. The spare parts listed shall serve all Equipment furnished.

The Contractor shall also furnish recommended spare parts selected by the Employer at the applicable unit rates, from the lists provided by the Bidders. Payment for recommended spare parts will be made from the amount set out in Schedule of Prices against items "Recommended Spare Parts". The spare parts listed shall serve all Equipment furnished. These spare parts shall not be used during Defects Liability Period, or earlier.

The Contractor shall supply, at his own cost any spare parts required during the Defects Liability Period.

SP-22 OPERATION & MAINTENANCE PERIOD

Operation & Maintenance period of the HVAC System shall be one (01) year, during Defects Liability Period (DLP). The Contractor shall operate service and maintain complete HVAC System for a period of one (01) year after date of issuance of Taking over Certificate. The plant shall be operated in accordance with provisions of Clause SP-02.2(b), SP-17.3 and as specified herein, and shall include supply of operating staff, consumables, all necessary adjustments, greasing, oiling and cleaning and the furnishing of necessary tools, instrument supplies and parts to keep the system in perfect operation, except such parts made necessary by misuse or neglect not caused by the Contractor.

The cost of operating the plant during operation & maintenance period shall be paid by the Employer to the Contractor under Schedule of prices item named "Operation & Maintenance during Defects Liability Period.

SP-23 APPROVAL FROM GOVERNMENT

The Contractor shall arrange and be responsible for all tests, test reports and approvals regarding electrical works under this contract, any other works under this Contract requiring tests/Government approvals. All the requirements to be completed for this purpose, whether specified or not shall be at the cost of the Contractor. The Contractor shall handover all test results and approval certificates to the Engineer within one week of obtaining such approval.

SP-24 PERFORMANCE GUARANTEE

The Contractor shall be required to furnish a Performance Guarantee in accordance with Conditions of Contract.

SP-25 SITE FACILITIES

Except for the Site facilities specifically stated in Conditions of Contract and/or Special Provisions, no other site facility shall be provided by the Employer to the Contractor.

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SP-26 SUFFICIENCY OF RATES AND CURRENCY FOR PAYMENT

All rates and amounts filled in the SOP by the Contractor for equipment/material whether locally procured or imported shall be deemed to include, but not limited to, the cost of items, custom duties, sales tax and surcharges, freight, marine insurance, local duties, sales tax and surcharges, clearance charges, inland transport and insurance, octroi, L/C opening charges, bank charges, etc. Payments to the Contractor shall be made in local currency.

SP-27 IMPORT LICENSE

The Contractor will arrange the import licenses if required for all the imported Equipment, Plant, Tools and Machinery to be incorporated in permanent works. All the costs and charges for arranging import licenses will be paid by the Contractor. The Contractor shall be responsible to arrange foreign exchange for import of all equipment and materials.

SP-28 GUARANTEES AND WARRANTIES

SP-28.1 Performance Guarantee

The contractor shall guarantee the performance of the complete HVAC system, viz.-a viz. his workmanship for the work executed at site, and quality of material, as specified. He shall replace the material/workmanship, whenever found not meeting the specified requirements, at his own cost.

SP-28.2 Manufacturer's Warranties

The contractor shall obtain manufacturer's standard warranties for all equipment extended for a period up to completion of Defects Liability Period at his own cost. In case the completion of Defects Liability Period is delayed, the contractor should obtain further extension of warranties. The contractor shall be responsible for cost of such extension, if the delay is due to his fault, otherwise the cost of such extension shall be reimbursed to him on production of acceptable documentary evidence of such costs.

SP-29 PACKING OF EQUIPMENT AND MATERIALS

All equipment and material shall be adequately packed at the manufacturer's works to protect them against damage, scratching, corrosion, dust, rain and moisture during handling, transportation and storage. The packaging shall be rigid enough to withstand normal service incidental to shipping and handling. Wherever necessary, crates/boxes shall be provided with lifting hooks attached by means of vertical rods or plates to strong bottom supports to enable rigging.

The following information shall appear inside all packages.

a) Stock or identification number
b) Description of contents/packing list
c) Quantity of each item
d) Invoice number
e) Year of manufacture

SP-30 INSPECTIONS AND TESTS

SP-30.1 Inspection by Engineer at Site

The Engineer shall inspect the works in progress at site as and when considered necessary by the Engineer and the Contractor shall provide full access and assistance to the Engineer for carrying out inspection to verify the conformity of works to general lay-out of HVAC System as designed and as shown on Drawings and as specified. Such inspection if made shall not relieve the Contractor from any obligations under the Contract.

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SP-30.2 Tests

A) General

i) All Tests as specified shall be carried out unless otherwise specified. The Engineer shall witness the tests.

ii) The Contractor shall give the Engineer at least seven days notice in writing of the date on which any equipment will be ready for inspection and/or testing as provided in the Specifications and unless the Engineer shall attend within seven days of the date which the Contractor has stated in his notice the Contractor may proceed with the tests in the Engineers absence and shall forthwith forward to the Engineer five duly certified copies of test readings, on the forms prescribed by the Engineer. The Engineer shall give twenty-four hours' notice in writing of his intention to attend any test.

iii) The Contractor shall provide all labor, materials, electricity, fuel, stores, apparatus machines and instruments as may be necessary to carry out tests, unless otherwise specified.

iv) The cost of all tests carried out by the contractor under this Clause shall be borne by the Contractor.

v) As and when any equipment or HVAC System or part thereof shall have passed any inspection/test the Engineer shall furnish to the Contractor a certificate in writing to that effect.

vi) The Engineer may reject any part or parts of Equipment, and HVAC System which he shall after inspection/ testing decide is not in accordance with the Specifications and Drawings and he shall give to the Contractor within fourteen (14) days of such inspection/ testing notice in writing of such rejection stating therein the grounds upon which his decision is based.

vii) The test results shall be filled out by the Contractor in the forms proposed by the Contractor and approved by the Engineer. Six copies of filled out forms shall be submitted to the Engineer for review and approval.

B) Preliminary Inspection & Tests

Preliminary Inspection/Tests as specified in Technical Specifications shall be carried out on all or any major HVAC equipment and such other equipment as the Engineer may require, on completion of installation of that equipment or at such time which the Engineer may require.

C) Balancing & Commissioning

Balancing and Commissioning shall be carried out on all or any major equipment, as Specified in Technical Specifications, when such is ready for operation. The Engineer must witness the Balancing and Commissioning procedures and Contractor shall proceed further after Engineer's written satisfactory approval.

D) Performance Tests

These tests as specified in Technical Provisions shall be carried out on each equipment of HVAC system after successful completion of Commissioning of that equipment, during appropriate season, on the dates proposed by the

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Contractor and approved by the Engineer. The Engineer keeping in view the weather conditions may fix the test date on any equipment of HVAC system within 6 months of Completion of Commissioning of that equipment.

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SPECIFICATIONS

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TECHNICAL PROVISIONS

SECTION 1 - GENERAL REQUIREMENTS

1-01 MATERIAL

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications cited herein. All materials, supplies, and articles forming part of major equipment and not fabricated by the manufacturer of the equipment shall be the products of the recognized reputable manufacturers.

1-02 WORKMANSHIP

Workmanship and general finish shall be of the highest grade, in accordance with the requirements specified herein, and the best modern standard practice.

1-03 EQUIPMENT

a) For ratings and characteristics of manufactured equipment, Equipment Schedule as appended to Technical Provisions shall be followed.

b) All equipment shall be manufactured by companies, which have had at least ten years' previous experience in the design and manufacture of equipment of comparable type, capacity and operating conditions. Unless otherwise approved by the Engineer.

c) Where the requirement of this Clause make any equipment proprietary or non-obtainable, the Engineer reserves the right to waive any portion or portions of it as required to obtain the intent of the technical specifications (s).

d) When a manufacturer's product is specified by name, or equivalent, it shall be in the sole judgment of the Engineer as to acceptability of any product, which is offered as equal to that specified.

e) Where two or more units of the same class of equipment are furnished, product of the same manufacturers shall be used; component parts of entire system need not be product of same manufacturer.

1-04 CHASSES AND OPENINGS

The Contractor shall provide shop drawings, templates or details for chases and openings to be left in concrete walls, concrete partitions, and floor or roof slabs to accommodate work under HVAC scope of works.

1-05 PROTECTION

The Contractor shall keep pipe, duct and other openings closed to prevent entry of foreign matter. All fixtures, equipment and apparatus shall be covered and protected against dirt, water, chemical or mechanical damage, before and during the construction period. All fixtures, apparatus, or equipment damaged including damaged shop coats of paint shall be restored to original conditions prior to Commissioning and also again prior to Final Acceptance. All bright finished shafts bearing housings and similar items shall be protected until in service: no rust will be permitted.

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1-06 CUTTING, PATCHING AND REPAIRING

Required for proper installation and completion of HVAC works, including masonry work, concrete work, carpentry work, painting and re-painting shall be performed by skilled craftsmen in respective trades, at expense of the Contractor. Construction shall be cut only after obtaining written permission from the Engineer.

1-07 LINES, LEVELS AND SPACES

The Contractor shall check dimensions at the building site and establish lines and levels for work specified in Specifications. The Contractor shall check with work of other trades to ensure proper clearance of piping, ductwork, conduit and other items. Any deviations observed between drawings and actual construction shall be brought to the notice of the Engineer. The erection supervisor shall regularly inspect, during progress of civil works, the areas allocated for installation of HVAC equipment and any conflict observed shall immediately be reported to the Engineer.

1-08 MACHINERY GUARDS

All moving parts of machinery are to be protected by strong guards to adequately protect all personnel working on or in the vicinity of equipment.

Wherever possible, moving parts should be protected by guards supplied by the equipment manufacturer. All guards must be strongly attached to equipment and should be designed for easy removal for access, servicing, adjustment and maintenance.

1-09 TOOLS

The Contractor shall supply in a toolbox, full sets of tools suitable for maintenance of all components of the plant furnished by him including the electrical equipment, for use by the Employer after completion of Maintenance Period. List of Tools shall be subject to approval by the Engineer.

1-10 OIL AND GREASES

Not Used

1-11 SPARE PARTS

The spare parts for HVAC System shall be duplicates of the original parts with same country of origin furnished and interchangeable therewith.

1-12 ACOUSTIC TREATMENT

The noise criteria for different areas stated in Special Provisions is to be obtained.

Sound measurements will be made at approximately five (5) feet above floor level in the occupied area served and not more than five (5) feet from the grills, diffusers or other air devices being tested. Instruments for sound measurement shall be provided by the Contractor.

Provision is to be made to minimize noise and vibration. However, different manufacturers equipment have varying sound and vibration characteristics and it is, therefore, the responsibility of the Contractor to ensure that the requirements in these specifications are fully met by the equipment he is offering. If the Contractor has any requirements for additional vibration or sound isolation, these must be incorporated into the price quoted.

All equipment installed should not be audible inside the occupied areas and the

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Contractor must ensure that all equipment he is offering is quiet and have satisfactory sound levels. Where silencers are required, these must be incorporated into the price quoted.

1-13 ACCESS PANELS

The Contractor shall mark locations of, and give sizes of, access panels required in false ceiling and wall paneling for adjustment and maintenance of HVAC Equipment, such as Dampers ceiling-hung equipment, etc. This information shall be provided to the Engineer before commencement of false ceiling work by the concerned persons.

1-14 SEALING OF OPENINGS

The contractor shall seal all openings in external walls and roof where HVAC ducts/pipes penetrate in external membrane. The sealing shall be air tight to prevent penetration of outside air and water into building. The method and materials for sealing shall be subject to Engineer's approval.

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SECTION 2 – EQUIPMENT

2-01 GENERAL

All equipment shall be of such overall dimensions, operating weights, service area requirements and configuration that it can be located where shown on the plans without any adverse effect on its performance and clearance requirements. Any change in other trades work, anticipated by offering alternate equipment, shall be estimated by the Contractor and its cost shall be included in the quoted price for HVAC Works.

Provision for clearance and service spaces shall be made around all mechanical equipment as recommended by equipment manufacturers.

All equipment supplied under this section shall be brand-new, factory manufactured and factory assembled (unless otherwise specified) and complete in all respects. The type, characteristics, capacity ratings, component sections of all equipment shall be as Scheduled.

All equipment furnished by the Contractor shall include vibration isolation mounting pads, anchor bolts, frames or any other mounting or supporting accessories.

All power driven equipment shall include drives, motors and adjustable motor foundation bases and accessories including machinery guards where applicable.

All equipment shall be completed with all accessories necessary to serve the intended purpose, whether specified or not.

All equipment installed on roof or intermediate floors shall include suitable vibration isolators to prevent any vibration traveling to building structure.

2-02 VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR-CONDITIONING UNITS (R-410A REFRIGERANT TYPE)

Unit(s) shall be latest series of high efficient variable refrigerant flow (VRF) high ambient type (46°C operable), remote, air cooled condensing unit, factory assembled, tested, cooling/heating, all DC inverter type, with multiple units connected through distributers/Y-connectors to outdoor unit as specified and shown. The unit shall be Eurovent/AHRI Certified.

The unit shall have one or more compressors that shall be all DC inverter driven, so their speed can be varied by changing the frequency of the power supply to the compressor. As the compressor speed changes, so does the amount of refrigerant delivered by the compressor.

I) Air Cooled Condensing Units (CU)

The condensing unit shall be of the vertical/horizontal discharge, air cooled type, suitable for outdoor installation and sized to deliver the required capacity matched to relevant DX-type indoor unit at specified ambient temperature. The condensing unit shall be of same manufacturer as the Indoor AC Unit and shall be suitable for operation at 115°F (46°C) ambient temperature conditions.

The unit casing shall be constructed from galvanized sheet steel, zinc phosphate and with a stoved enamel finish. All access panels and the unit casing shall be provided with thermal and acoustic insulation. All moving components such as compressors and condenser fan motors shall be anti-vibration mounted to minimize the transmission of vibration and noise. The Condensing unit shall be of same manufacturer as the Indoor AC unit.

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Condenser coils shall be made of seamless copper tubes mechanically expanded into aluminum fins.

Condenser fans shall be of direct drive, statically and dynamically balanced propeller type. Weatherproof fan motors suitable for outdoor use, permanently lubricated and provided with built-in thermal overload protection shall be used. Fans shall be mounted on rubber vibration dampers. All condensing units shall be weatherproof and capable of operating satisfactorily at high and low outdoor temperatures at full load.

Hermetically sealed scroll compressors shall be fitted with internal and external shock absorbers to minimize vibration and noise transmission. The compressor shall be fitted with a discharge line silencer and charged with the required quantity of oil for adequate lubrication circulated by means of an internal oil pump.

Internal overload protection located in the motor windings shall be provided.

Suction and discharge pipes shall be equipped with pipe vibration dampers. Condensing units shall be factory pressure tested, evacuated and dehydrated. Insulation shall be Class-O type Elastomeric extruded Nitrile Rubber tubing to fit standard diameters of copper tubing 10 OZ (280 gm) canvas with sealing adhesive coat.

The refrigerant piping from indoor to outdoor shall be Type-L copper pipes and shall conform to ASTM B280 standard for ASTM sizes (For other sizes, equivalent HVACR standards shall be complied). The insulation for refrigerant piping shall be as per schedule in Section-5.

The outdoor units shall be installed on concrete foundation on roof as shown on the drawings.

All indoor units shall have built in expansion valve/pulse motor valve to be controlled by the room thermometer and control output of DC inverter compressor.

ii) Indoor Unit (SAC- Unit)

The DX-type indoor units shall be elegant, ceiling concealed fresh air ducted type and decorative ceiling recessed (cassette) type as specified. All units are Heat Pump type. All component parts shall be selected, manufactured and assembled by the same manufacturer as for outdoor Condensing unit.

Each unit shall be constructed so as to prevent drumming, distortion and vibration and shall enable ease of handling and replacement of sections.

All indoor units shall have built in expansion valve/pulse motor valve to be controlled by the room thermometer and control output of DC inverter compressor.

All indoor units shall be individually ON/OFF by remote control.

The units shall include the following sections.

- Washable filters
- DX-type cooling/heating coil
- Supply air fan and motor
- Thermostat microprocessor type with cooling & heating mode
- Automatic air swing mechanism
- Supply air adjustable grille
- Expansion Valve/Pulse Motor Valve (Built In)

The casing shall comprise of galvanized sheet steel, zinc phosphate, with a stoved enamel finish or as approved by the engineer and shall include supply and Return air

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grilles. For cassette type AC units, the colour of the front grille shall be approved by the Engineer.

Fan shall be statically and dynamically balanced centrifugal type with backwardly or airfoil blades to suit the pressure and operating characteristics specified.

Fan housings shall be constructed from galvanized steel sheet. The casing shall be constructed to a truly volute form.

Shafts shall be cold finished, turned, and polished steel. Bearings shall be self-aligning, permanently lubricated ball bearings.

All parts of fans and motors liable to deterioration shall be protected by paint or grease before delivery to site.

Filters with dust arrestance of 35% as per ASHRAE standards shall be provided. The filter media shall be washable, cleanable, reusable, chemical and moisture resistant, non-perishable, and flame resistant.

Cooling coils shall be manufactured from solid drawn seamless copper tube staggered in the direction of air flow. Tube return bends shall be copper and brazed to tube ends.

Fins shall be of continuous aluminum having extended collars for spacing and bonding mechanically to the tube.

Coils shall be air pressure tested to 20.6 bar while immersing the coil in a tank of water after completion.

Tubes shall be expanded onto the fin collar by hydraulic pressure only.

No part of the coil tube ends or headers shall be external to the section. Coils shall be suitably sealed with grommets where connections pass through the unit casing.

The air-cooler shall incorporate a galvanized drain pan with integral insulation. The pan shall be fitted with galvanized drain socket connections for attachment to drain points. A manometric trap should be supplied and installed by the installing contractor.

The coil shall be easily removable from the unit for maintenance and cleaning purposes.

The coil shall include a thermostatically controlled built in expansion valve.

A LCD type wired/wireless controller shall be provided with each indoor VRF with option of fan speed, time schedule, temperature settings, mode selection, automatic storage of all settings when power off, etc.

In case of Cassette type unit condensate drain pump shall be provided with unit.

All cooling coil condensate drain shall be uPVC class D. The fittings for the cooling coil condensate drain shall be uPVC class D.

iii) Controls and PC Based Controller

A multi-functional centralized controller shall be supplied with each VRF outdoor unit. The control shall be capable of integrating with the building management system.

The units shall be equipped with Auto Restart function, which allows the unit to start in the same mode prior to the power failure. Digital thermostat. Units shall be

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controlled with user friendly, wall mounted microprocessor based LCD, wired remote controller. The wired remote controller shall have the following features:

a) 24 hour ON / OFF timer in 1-hour interval.
b) Self-diagnosis function.
c) Operation indication.
d) Room temperature display
e) Weekly programming.
f) 3 speed fan control.
g) Auto swing (indoor unit)
h) Clean filter indication (indoor unit). Start/stop operation, set point control, cool/heat mode selection and enabling/disabling operation of the remote.
i) Monitoring of operation status of the indoor units and error code of the group or the zone.
j) Comprehensive timer function to start/stop the air conditioning systems. This can be set for year, month, day of week, hour and minute. This will enable normal day-to-day time clock functions as well as yearly holiday set up.

Computerized control shall be used to maintain a correct room temperature either at the fan coil or from a sensor in the remote controller. The system shall be equipped with a self-diagnostic feature for easy service and maintenance. The LCD remote controller shall be able to control up to multiple indoor units as a group. It shall also be possible to select cooling, heating, fan only or automatic change over mode for heat recovery systems.

2-03 DX-TYPE AIR HANDLING UNITS WITH MATCHING CONDENSING UNIT

2-03.1 DX-Type Air Handling Units (EUROVENT Certified product for Mechanical & Performance Characteristics)

2-03.1.1 General

The characteristics and capacities of air handling units shall be as scheduled. The configuration of component sections shall be as scheduled and as shown on Drawings. All AHUs shall complete with drives, motors, and belts. These shall include mixing box with dampers, filters and humidifiers when scheduled. Filter specifications are given separately in this section.

AHUs shall be of imported origin as mentioned in equipment schedule or list of approved equipment/material or approved by the Engineer.

For purpose of calculation of motor BHP, specified external SP and AHU manufacturer's internal SP should be added. Filter pressure drop shall be part of internal SP, which shall be calculated on average of clean (initial) and filter manufacture-recommended dirty (final) pressure drop. Published recommendation of filter manufacturer shall be furnished along with technical submittal. In case published recommendation is not available, a recommendation on the printed stationery of filter manufacturer shall be acceptable provided the manufacturer certified that no such published data is available. Motor HP shall be at least 120% of calculated BHP.

The EUROVENT certified air handling units shall meet the requirements of AHRI 430-86 and ASHRAE 51-85 standards and shall be factory tested according to the requirements of these standards. The AHUs shall be certified for following characteristics;

Mechanical Characteristics

- Casing strength (CS) – D1
- Casing air leakage (CAL) – L1/L2
- Filter bypass leakage (FBL) – F9

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- Thermal transmittance of the casing (TT) – T1/T2
- Thermal bridging factor (TBF) – TB1/TB2
- Acoustical insulation of casing

Performance Characteristics

- Air flow - Available static pressure - power input
- Octave band in-duct sound power level
- Airborne sound power level
- Heating capacity
- Cooling capacity
- Calculated Eurovent AHU Energy Efficiency Class

The (EFF3, TEFC, CLASS F Insulated, VFD Compatible) motors make, country of origin and model no. shall be identified during technical submission and shall be from manufacture's best ranking make, most efficient and shall be included in manufacturer's scope of standard.

Cleaning methodology, general arrangement and dimension of the AHU including location of doors and/or hatches shall be including in the Installation and Operation Manual of the product.

2-03.1.2 Construction

These shall be factory assembled draw-through packaged air handling unit of capacities and characteristics as scheduled. Air handling units shall be horizontal or vertical with component and configuration as scheduled and shown on the drawings.

Large AHUs may be shipped in sections e.g. Fan Coil Section, filter section, mixing box section for ease of transportation and rigging.

AHRI Certified (AHRI 410-91) Coils shall be of copper construction with mechanically bonded smooth aluminum fins, suitable for chilled water and hot water applications.

Fan shall be high efficiency (Airfoil/ Backward Curved) mounted on a common shaft. Fan impeller shall be statically and dynamically balanced and shall have permanently lubricated bearings. Fan shall be belt driven with adjustable sheaves. Fan shall have spring isolation from the casing. All fans shall be in accordance with AMCA 210 Standard for performance.

Casing shall be made of sheet steel and finished with baked enamel. (Or approved by the Engineer) The casing shall be double skin with minimum 1-1/2 inch thermal insulation between the skins and removable panel type. AHU shall be equipped with factory fabricated filters and filter boxes with side access door.

The AHUs shall have inner surfaces of stainless steel. Before coating with the stainless steel, an antibacterial silicon sealant is applied to the unit to prevent water leakage to the bottom part. The unit shall be coated with antimicrobial powder.

All coil bases and sledges shall be made of Cr-Ni stainless steel.

A condensate drain pan, with double wall construction and insulation in between, shall be provided as per ASHRAE 62.1-2010. Inner pan shall be finished with a factory applied coating of corrosion resistant material. Insulation, adhesive and inner coatings shall comply with NFPA-90A Standard.

Flat filters installed in Air Handling Units, shall be permanent, impingement, dry type, washable, all metal, panel type, at least 2 inch thick unless otherwise scheduled. Media shall be aluminum screen, arranged in alternate layers of flat and herringbone-crimp, 4 layers of each per one inch reinforced and enclosed in a frame of 16 gauge

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galvanized steel with flush mitered corners. Initial pressure drop at 500 FPM shall not exceed 0.1 inch WG. Holding frame shall be factory-built of 16 gauge steel, with felt air seal. Filters shall have at least 35% efficiency on 0-5 microns range when tested in accordance with ASHRAE Standard 52-76.

Bag filter in AHUs shall be extended surface dry type non-supported pocket, cartridge filter. Average efficiency shall not be less than 90% when tested as per ASHRAE standard 52. Initial resistance at 500 FPM shall not exceed ½ inch.

Steam humidifiers of capacity as per equipment schedule shall be of self-contained, electronically controlled design suitable for installation in AHUs. Humidifier shall generate steam from ordinary tap water. It shall have full modulating control to provide 0 to 100% capacity. Drain cycle will be self-regulating for automatic control of mineral (conductivity) build-up. Humidifier shall have programmed diagnostics to confirm that input and output circuits are functioning. The humidifier steam generator shall be of cleanable type which can be taken apart for inspection. The electronic circuit shall provide automatic protection from excessive electrode current. The humidifier fill water line shall have an air gap to prevent backflow. Humidifier shall have interface for controller integration and control. It shall be supplied with stainless steel steam dispersion tube and with condensate connections.

Electric heaters (if required) shall be of resistance type air heaters as scheduled. Heaters shall be suitable for three-phase power supply. All heaters above 10KW shall be multi stage heaters. Face velocity over heater shall not be less than 550 FPM. Heater elements shall be supported in metal frame with center to center distance not more than 8 inches and furnished with terminal box, thermal cutout device with manual reset button and static pressure type air-flow switch. The connections to the elements shall be made by and approved stud-type projection. Heaters shall be furnished complete with all necessary wiring. Heater circuit shall provide balanced 3-phase conditions when energized. Heaters shall be furnished with a rust-resistant and heat resistant paint or metallic finish. Heating elements and insulated connections shall be corrosion resistant and shall be impervious to moisture. Heaters shall be suitable for installation inside air conditioners, or inside supply duct depending upon the space availability inside air conditioner.

2-03.1.3 Spare Parts for Air Handling Units

Following spare parts shall be provided as a minimum along with the spares recommended by the Manufacturer.

a)	Fan Belts	01 set for each AHU type
b)	Mechanical Seal	01 set for each AHU type
c)	Motors	01 for each AHU type

2-03.2 Air Cooled Condensing Units for DX-Air Handling Units

The condensing unit shall be of the vertical discharge, air cooled type, DC inverter type, suitable for outdoor installation and sized to deliver the required capacity matched to relevant DX-type indoor AHUs at specified ambient temperature. The condensing unit shall be of reversible type and shall be suitable for operation at 115°F (46°C) ambient temperature conditions.

The unit casing shall be constructed from galvanized sheet steel, coated with zinc phosphate and with a stove enamel finish. All access panels and the unit casing shall be provided with thermal and acoustic insulation. All moving components such as compressors and condenser fan motors shall be anti-vibration mounted to minimize the transmission of vibration and noise.

Condenser coils shall be made of seamless copper tubes mechanically expanded into aluminum fins.

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Condenser fans shall be of direct drive, statically and dynamically balanced propeller type. Weatherproof fan motors suitable for outdoor use, permanently lubricated and provided with built-in thermal overload protection shall be used. Fans shall be mounted on rubber vibration dampers. All condensing units shall be weatherproof and capable of operating satisfactorily at high and low outdoor temperatures at full load.

Hermetically sealed scroll/screw compressors shall be fitted with internal and external shock absorbers to minimize vibration and noise transmission. The compressor shall be fitted with a discharge line silencer and charged with the required quantity of oil for adequate lubrication circulated by means of an internal oil pump.

Internal overload protection located in the motor windings shall be provided.

The units shall be complete with ASTM B280 refrigerant piping & insulation and all necessary valves and filter drier from the unit to the air cooler. Suction and discharge pipes shall be equipped with pipe vibration dampers. Condensing units shall be factory pressure tested, evacuated and dehydrated.

The unit shall be provided with AHU kit as applicable which is capable to configure with AHUs.

The units shall be installed on concrete foundation on roof as shown on the drawings.

2-03.3 Controls and Controller

2-03.3.1 General

Standalone DDC Controllers with LCD display shall be installed for local monitoring and control of AHU and condensing unit. The controller shall be provided with Condensing Units, which is capable to configure with AHU.

All labour, material, equipment and software necessary to meet the functional requirements of the system as specified herein shall be included in the scope of work. Drawings are diagrammatic only and all controls, materials, etc. not shown but necessarily required to meet the functional intent shall be provided by Contractor without any additional cost to the Owner.

The Contractor shall discuss the control layout with the Engineer and coordinate at site with other services for exact route, location and position of control equipment and wiring.

The complete Control System installation shall conform to the applicable standards of NFPA, NEC, IEC and UL and the local electrical codes. All devices designed for or used in line voltage applications shall be UL listed.

The sequence of operation will be submitted by the Controller suppliers which will be reviewed and approved by the Consultant before application.

2-03.3.2 Control and Monitoring

The system shall comprise of a fully integrated Control System incorporating Direct Digital Control (DDC), consisting of the following elements:

1. Microprocessor based LCD type DDC Controllers, interfacing directly with sensors, actuators and environmental delivery systems (i.e. HVAC equipment, dampers etc.)

2. Electric/electronic controls and sensors and final control elements including actuators etc.

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3. A peer communication network to allow data exchange from field devices to DDC controllers.

2-03.3.3 DDC Control Units

Provide an adequate number of control units to achieve monitoring and control of all data points specified and necessary to satisfy the sequence of operation for all HVAC systems specified in drawings and specifications. Controllers shall meet the following requirements.

1. Controllers shall be suitable for the anticipated ambient conditions.
2. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures.
3. All Controller set points shall be digital display (LCD Type) set points with dual set point limits (integral hard limits which the user cannot exceed above and below and independent soft limits which are hidden from the user). All digital set points shall be network retentive after power outages and after the replacement of sensor.
4. Serviceability: Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
5. Immunity to power: Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage.
6. All DDC controllers must have 10% spare input/output points (AI, DI, DO & AO).

Controllers shall be provided for DX-type Air Handling Units and its matching Condensing units.

The Controller shall have sufficient Input/Output points to meet the Project requirements. Stand-alone mode control functions operate regardless of network status. Functions include the following:

1. Peer to peer primary network level communications with automatic communications loss detection to maintain normal control functionality regardless of available network communications.
2. Discrete/digital, analog, and pulse input/output.
3. Monitoring, controlling, or addressing data points.
4. Appropriate BACnet objects for specific unitary applications.
5. Incorporate internal customizable safeties and limits to prevent third party BACnet tools from providing improper and unrealistic inputs to the Controller.

Controller shall have capability to monitor/ control the input/output points; process information; and expressions for customized HVAC control including mathematical equations, Boolean logic, PID control loops with anti-windup, sequencers, timers, interlocks, thermostats, counters, interlocks, compare, limit, and alarms.

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2-03.3.4 Field Devices- General

Provide where indicated on the drawings or as specified, the microprocessor, electronic and/or electric control system components and sensing devices as required. The field devices shall be interfaced directly with the Control System to provide a totally integrated control system.

Input/output sensors and devices shall be closely matched to the requirements of the DDC controllers for accurate, responsive and noise-free signal input/output. Control input response shall be of high sensitivity and matched to the loop gain requirements of precise and responsive control.

2-03.3.4.1 Temperature Instruments

Resistance temperature detectors shall be Platinum, thermistor or balco.

a) Temperature Sensors Space Type. Sensor shall be with remote set point adjustment capability and temperature indication. It shall be provided with institutional type locking covers. The operating range shall be 0°C to 60°C with an accuracy of ± 0.2°C.

b) Temperature sensor for outside air. The sensor shall be weather proof type suitable for mounting in open and shall be provided with sun shield and splash proof housing. The operating range shall be -40°C to +130°C with an accuracy of ±0.2°C.

2-03.3.4.2 Humidity Instruments

Humidity Sensors: Relative humidity Sensors shall use non- saturating Sensing elements. Sensors shall have a range of 10 to 90% with an accuracy of plus or minus 2% of full scale.

2-03.3.4.3 Pressure Instruments

Pressure Switches: Pressure differential pressure switches shall have a repetitive accuracy of plus or minus 1% of their operating range and shall withstand up to 150% of operating pressure. Sensors shall be diaphragm or bourden tube. Switch operation shall be adjustable over the operating pressure range. The switch shall have a snap action form - 'C' contact rated for the application. Switch contacts shall be wiping contacts of Platinum Alloy, Silver Alloy, or gold plated and shall have an adjustable differential setting.

Differential-pressure switch with adjustable range of 20 to 200 Pa.

2-03.3.4.4 Variable Frequency Drive (VFD)

The VFD shall be enclosed in a UL/NEMA Type enclosure, completely assembled and tested by the manufacturer. The VFD shall provide full rated output from a line of ±10% of nominal voltage. The VFD shall continue to operate without faulting from a line of +30% to -35% of nominal voltage.

VFDs shall be capable of continuous full load operation under the following environmental operating conditions:

a. -5 to 45 °C ambient temperature. Operation to 50 °C shall be allowed with a 10% reduction from VFD full load current.
b. Humidity less than 95%, non-condensing.

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All circuit boards shall be coated to protect against corrosion. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.

The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes.

VFD programming shall be held in non-volatile memory and shall not be dependent on battery power. The VFD's shall utilize pre-programmed application macros specifically designed to facilitate start-up.

The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).

The VFD shall have the ability to automatically restart after over-current, overvoltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds every minute.

The input current rating of the VFD shall not be greater than the output current rating. Input and output current ratings must be shown on the VFD nameplate.

The VFD shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.

All VFDs to have the following adjustments.

1. Two (2) programmable analog inputs shall accept current or voltage signals.
2. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage and other data.
3. Two (2) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC.
4. One (1) programmable digital output.

The voltage/frequency ratio shall be suitable for speed control of fans. It should not be possible to set a constant voltage/frequency ratio to prevent damage to connected equipment and to optimize energy consumption. The converter shall regulate the output to adapt it continuously to the current flow so as to minimize energy consumption.

2-03.3.4.5 Electrical Transducers

Transducers shall be of the case mounted type having the following specifications:

- 0.2 Class Index accuracy with 0.2% of reading accuracy for the Watt and VAR transducers.
- 3 times continuous overload capability at 25°C.
- 4 kV isolation between all inputs and outputs for 1 minute.

All transducers shall be of either DIN rail mounting and/or surface mounting.

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Transducer housing shall be of two part construction with the cover being made of flame retardant glass filled modified PPO to UL94V1 with a comparative tracking index of 200 minimum to IEC-132.25. The case material shall be polycarbonate, flame retardant to UL94V0.

1. Voltage Transducer

The accuracy of the transducer shall be ±0.2% of full scale output and shall be capable of converting the outputs of potential transformers to industry compatible form acceptable as DDC/Control System input.

2. Current Transducer

The current transducer shall have an accuracy of ±0.2% of full scale output and shall be capable of converting 0-5A output of current transformers to industry compatible form acceptable as DDC/Control System input.

2-03.3.4.6 Smoke Detectors

All smoke detectors mounted on the AHU return ducts shall be the duct mounted photoelectric type.

The detector shall sample the air passing through the AHU to provide early detection of a developing hazardous condition or fire. When smoke is detected by the detector at the return air duct, the AHU fan shall be shut down.

The detector head shall be housed in an integral housing with filter system for reduced maintenance and service. The detector head shall be accessible without removing the duct housing. The air velocity limits shall be 1.5 to 25.4 m/sec.

For reliability and safety considerations, the smoke detector shall comply to UL, FM, CSFM and BSA standards. The detector shall feature:

- Tight metal die cast housing.
- Integral indicator lamps for power ON & ALARM.
- External indication for alarm operation mounted suitably so as to exactly locate which detector has activated.
- Permissible air speed-up to 16 m/sec.
- Accommodates ionization or photoelectric heads.
- Simple change-out of detectors heads: twist-in, twist-out.
- Easy to maintain.
- Powered outputs for remote LED and Sounder/Strobe.
- Air velocity rating from 300 to 4000 feet per minute (1.5 to 25.4 m./sec.)
- UL 268A List.
- Reset Time : 0.3 seconds (max.)
- Clear polycarbonate cover for convenient visual inspection of sampling tube filters.
- Rugged Noryl housing (mounting portion).
- Remote test station option.
- Easy and quick mounting to round or rectangular ducts from 1 to 12' (0.305 to 3.66 m.) wide.
- 3-Year Limited Warranty.

2-03.3.4.7 Carbon-Dioxide Detector

Single or multi-channel, dual-level detectors, using solid-state sensors with 3-year minimum life, maximum 15-minute sensor replacement, suitable over a temperature range of 23°F to 130°F.

The CO_2 sensor shall be provided with each AHU. The outside air damper of the AHU

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shall be modulated to maintain a CO_2 sensor shall be provided for each AHU. The outside air damper of the AHU shall be modulated to maintain a CO_2 level of 1000 ppm.

2-03.3.4.8 Static-Pressure Transmitter

Non-directional sensor with suitable range for expected input, and temperature compensated.

1. Accuracy: +/- 1 percent of full scale with repeatability of 0.5 percent.
2. Output: 4 to 20 mA, 0-5 vDC, 0-10 vDC.
3. Pressure Transmitters: Direct acting for gas, liquid, or steam service, range suitable for system: proportional output 4 to 20 mA.

2-03.3.4.9 Actuators

For Dampers:

i) Size for running torque calculated as follows:

- Parallel-Blade Damper with Edge Seals: 7 inch-pounds/sq. ft. of damper.
- Opposed-Blade Damper with Edge Seals: 5 inch-pounds/sq. ft. of damper.
- Parallel-Blade Damper without Edge Seals: 4 inch-pounds/sq. ft. damper.
- Opposed-Blade Damper without Edge Seals: 3 inch-pounds/sq. ft. of damper.
- Dampers with 2 to 3 inches wg. of Pressure Drop or Face Velocities of 1000 to 2500 FPM Multiply the minimum full-stroke cycles above by 1.5.
- Dampers with 3 to 4 inches wg. of Pressure Drop or Face Velocities of 2500 to 3000 FPM Multiply the minimum full-stroke cycles above by 2.0.

ii) Spring Return Manual Override actuators shall a factory set 5 Degree Damper Preload.

2-03.3.5 Dampers

AMCA-rated, parallel, opposed blade designs: 0.1064 inch minimum, galvanized-steel frames with holes for duct mounting; damper blades shall not be less than 0.0635 inch galvanized steel with maximum blade width of 8 inches.

a. Blades shall be secured to 1/2-inch diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.

b. Operating Temperature Range: -40°c to 93°C.

c. For standard applications, include optional closed-cell neoprene edging.

For low-leakage applications, use parallel- or opposed-blade design with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4 inches wg. when the damper is being held by torque of 50 in. x lbf, when tested according to AMCA 5000.

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2-03.3.6 Control Cable

Cable for Control Wiring shall be UTP category-5 or better.

Adequately protect all cables from environment through which they pass through to avoid the possibility of mechanical damage or electromagnetic interference.

Install cabling and conduits associated with sensors so as to prevent spurious transfer of moisture, heat etc. from external sources to sensing devices.

All cables shall have identification sleeves at their terminations which combine the requirement of local electrical codes with those for specific circuit identification. Ensure identification is consistent with all relevant wiring/control diagrams.

2-03.3.7 Sequence of Operation

2-03.3.7.1 DX-Type Air Handling Units with matching Condensing Units

Tentative sequence of operation is provided below. It will be finalized after review and approval of Technical Submittal of the HVAC Control System by the Consultant before application.

The DX-Type AHU and its Condensing unit shall be energized by DDC controller either by operator command or as per programmed schedule.

Differential pressure switch (DPS) across each of AHU supply air fan shall monitor the discharge pressure. In case, no pressure differential is recorded by PDS when the fans are switched 'On', an alarm shall be generated and DDC controller shall shut down the AHU.

Differential pressure switches (DPS) across AHU filters shall monitor the air pressure. In case, certain pressure differenbal is recorded by PDS, an alarm shall be generated at DDC Controller to indicate dirty/clogged filter condition.

A CO_2 sensor, installed in return air duct, shall monitor the quality of air for diagnostic purposes.

A photoelectric type smoke detector, installed in return air duct, shall monitor the condition of air. In case of smoke detection, an alarm shall be generated and DDC controller shall shut down the AHU.

A LCD type DDC controller in the AHU room shall remotely command ON or OFF to AHU/CU, set temperature & humidity of the room.

For diagnostic purposes, the DDC controller shall monitor/record the mixed air, supply air and return air temperatures through duct mounted temperature sensors.

2-03.3.7.2 DX-Type Air Handling Units with matching Condensing Units and Exhaust Fans

Tentative sequence of operation is provided below. It will be finalized after review and approval of Technical Submittal of the HVAC Control System by the Consultant before application.

The DX-Type AHU, its Condensing unit and associated Exhaust Fan shall be energized by DDC controller either by operator command or as per programmed schedule.

Differential pressure switch (DPS) across each of AHU supply air fan and Exhaust Fan shall monitor the discharge pressure. In case, no pressure differential is recorded

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by PDS when the fans are switched 'On', an alarm shall be generated and DDC controller shall shut down the AHU and Fan.

Differential pressure switches (DPS) across AHU filters and ducted Mounted HEPA Filter shall monitor the air pressure. In case, certain pressure differential is recorded by PDS, an alarm shall be generated at DDC Controller to indicate dirty/clogged filter condition.

A CO_2 sensor, installed in return air duct, shall monitor the quality of air. In case of contaminated air, the DDC controller shall increase the amount of fresh air and decrease the amount of return air through motorized dampers.

A photoelectric type smoke detector, installed in return air duct, shall monitor the condition of air. In case of smoke detection, an alarm shall be generated and DDC controller shall shut down the AHU.

A LCD type DDC controller in the AHU room shall remotely command ON or OFF to AHU/CU/Exhaust Fan, set temperature & humidity of the room.

For diagnostic purposes, the DDC controller shall monitor/record the mixed air, supply air and return air temperatures through duct mounted temperature sensors.

2-03.3.7.3 **DX-Type Air Handling Units with matching Condensing Units and Heat Recovery Ventilator**

Tentative sequence of operation is provided below. It will be finalized after review and approval of Technical Submittal of the HVAC Control System by the Consultant before application.

The DX-Type AHU and its Condensing unit shall be energized by DDC controller either by operator command or as per programmed schedule. The AHU DDC controller shall be interlinked with HRV DDC to receive and provide command to HRV.

Differential pressure switch (DPS) across each of AHU supply air fan shall monitor the discharge pressure. In case, no pressure differential is recorded by PDS when the fans are switched 'On', an alarm shall be generated and DDC controller shall shut down the AHU.

Differential pressure switches (DPS) across AHU filters and ducted Mounted HEPA Filters shall monitor the air pressure. In case, certain pressure differential is recorded by PDS, an alarm shall be generated at DDC Controller to indicate dirty/clogged filter condition.

A CO_2 sensor, installed in return air duct, shall monitor the quality of air. In case of contaminated air, the DDC controller shall increase the amount of fresh air and decrease the amount of return air through motorized dampers.

A photoelectric type smoke detector, installed in return air duct, shall monitor the condition of air. In case of smoke detection, an alarm shall be generated and DDC controller shall shut down the AHU.

A LCD type DDC controller in the AHU room shall remotely command ON or OFF to AHU/CU, set temperature & humidity of the room.

For diagnostic purposes, the DDC controller shall monitor/record the mixed air, supply air and return air temperatures through duct mounted temperature sensors.

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2-03.3.7.4 Heat Recovery Ventilator

Tentative sequence of operation is provided below. It will be finalized after review and approval of Technical Submittal of the HVAC Control System by the Consultant before application.

The HRV shall be energized by DDC controller either by operator command from DDC AHU or as per programmed schedule. The HRV DDC controller shall be interlinked with AHU DDC to receive feedback.

Differential pressure switch (DPS) across each of supply air and exhaust fan shall monitor the discharge pressure. In case, no pressure differential is recorded by PDS when the fans are switched 'On', an alarm shall be generated and DDC controller shall shut down the HRV.

Differential pressure switches (DPS) across HRV filters shall monitor the air pressure. In case, certain pressure differential is recorded by PDS, an alarm shall be generated at DDC Controller to indicate dirty/clogged filter condition.

A LCD type DDC controller in weather proof panel on roof shall remotely command ON or OFF HRV.

For diagnostic purposes, the DDC controller shall monitor/record the supply air temperatures and humidity through duct mounted temperature sensors.

2-03.3.7.4 Staircase and Elevator Well Pressurization System

The fans of Staircase and Elevator Pressurization System shall be energized by DDC controller in case of fire alarm in the building.

Pressure sensors shall monitor the pressure in the staircase and Elevator Well. According to desired pressure level, the fan speed shall be adjusted through VFD.

A differential pressure switch (DPS) across fans shall monitor the discharge pressure. In case, no pressure differential is recorded by PDS when the fan is switched 'On', an alarm shall be generated at the central control room and the DDC controller shall shut down the fan.

Smoke detectors shall be installed in each fans supply air duct. In case, smoke is detected, that fan shall be switched off by the DDC and an alarm shall be generated.

The fans of Staircase Pressurization System shall be de-energized either by DDC controller as per programmed logic or by operator command as per standard operating procedure.

2-03.3.8 DDC Point Summary Sheet

An estimated summary of DDC Controllers' I/O point list is provided here. Actual I/O requirements shall be finalized in accordance with Automatic Control System submittal after approval by Engineer.

	DESCRIPTION	AI	AO	DI	DO
A.	**DX-TYPE AIR HANDLING UNITS (Typical for AHU – 01, AHU – 02 and AHU – 04)**				
1	Return / Supply Air Humidity	2	--	--	--
2	Supply/Return/Mixed Air temperature	3	--	--	--

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	DESCRIPTION	AI	AO	DI	DO
3	Air Dampers actuation for Mixing Air	--	2	--	--
4	Filter PDS	--	--	2	--
5	Fan PDS	--	--	1	--
6	Fan On/Off	--	--	--	1
7	CO_2 Sensor	1	--	--	--
8	Humidifier On/Off	--	--	--	1
9	Smoke Detector	--	--	1	--
10	Condensing Unit On/Off	--	--	--	1
11	Condensing Unit On/Off Status	--	--	1	--
B.	DX-TYPE AIR HANDLING UNITS WITH EXHAUST FAN (AHU – 03)				
1	Return / Supply Air Humidity	2	--	--	--
2	Supply/Return/Mixed Air temperature	3	--	--	--
3	Air Dampers actuation for Mixing Air	--	2	--	--
4	Filter PDS	--	--	2	--
5	PDS for Duct Mounted HEPA Filter	--	--	1	--
6	Fan PDS	--	--	1	--
7	Fan On/Off	--	--	--	1
8	Exhaust Fan On/Off	--	--	--	1
9	Exhaust Fan PDS	--	--	1	--
10	CO_2 Sensor	1	--	--	--
11	Humidifier On/Off	--	--	--	1
12	Smoke Detector	--	--	1	--
13	Condensing Unit On/Off	--	--	--	1
14	Condensing Unit On/Off Status	--	--	1	--
C.	DX-TYPE AIR HANDLING UNITS WITH HEAT RECOVERY VENTILATOR (AHU – 05)				
1	Exhaust/Supply Air Humidity	2	--	--	--
2	Supply/Exhaust Air temperature	2	--	--	--

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	DESCRIPTION	AI	AO	DI	DO
3	Filter PDS	--	--	2	--
4	PDS for Duct Mounted HEPA Filter	--	--	2	--
5	Fan PDS	--	--	1	--
6	Fan On/Off	--	--	--	1
7	CO_2 Sensor	1	--	--	--
8	Smoke Detector	--	--	1	--
9	Condensing Unit On/Off	--	--	--	1
10	Condensing Unit On/Off Status	--	--	1	--
11	HRV DDC	--	--	1	1
D.	**HEAT RECOVERY VENTILATOR (HRV-01)**				
1	Supply Air temperature	1	--	--	--
2	Filter PDS	--	--	2	--
3	Fan PDS	--	--	2	--
4	Fan On/Off	--	--	--	2
5	AHU DDC	--	--	1	1
E.	**Staircase Pressurization (Typical for 02 Nos.)**				
1	Fan VFD Control	1	1	1	1
2	Fan DPS status (trip/fault)	--	--	1	--
3	Fire Alarm Signal	--	--	1	--
4	Pressure Sensor	2	--	--	--
F.	**Elevator Well Pressurization**				
1	Fan VFD Control	1	1	1	1
2	Fan DPS status (trip/fault)	--	--	1	--
3	Fire Alarm Signal	--	--	1	--
4	Pressure Sensor	2	--	--	--

2-03.3.8 Field Quality Control

Manufacturers' Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

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1. Leak Test: After installation, fill system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment, and retest.
4. Calibrate and test electric/electronic thermostats by disconnecting input sensors and stimulating operation with compatible signal generator.

2-04 ENERGY RECOVERY VENTILATOR (HRV)

2-04.1 General

The Energy Recovery Ventilator shall be suitable for operation in health care facilities. The unit shall maintain high indoor air quality (IAQ) by recovering energy from exhaust air while supplying fresh, filtered outside air.

HRV shall be provided with Plate Heat Exchanger heat recovery section to conserve the energy. The heat recovery section shall have sufficient size to accommodate the proper heat exchange in between exhaust air and outside air.

The characteristics, configuration of component sections and capacities of Energy Recovery Ventilator shall be as scheduled and as shown on drawings. HRV shall be complete with filters, heat exchanger plates, drives, motors, and belts.

HRV shall be of imported origin as mentioned in equipment schedule or list of approved equipment/material or approved by the Engineer.

For purpose of calculation of motor BHP, specified external SP and HRV manufacturer's internal SP should be added. Filter pressure drop shall be part of internal SP, which shall be calculated on average of clean (initial) and filter manufacture-recommended dirty (final) pressure drop. Published recommendation of filter manufacturer shall be furnished along with technical submittal. In case published recommendation is not available, a recommendation on the printed stationery of filter manufacturer shall be acceptable provided the manufacturer certified that no such published data is available. Motor HP shall be at least 120% of calculated BHP.

The EUROVENT certification shall meet the requirements of AHRI 430-86 and ASHRAE 51-85 standards and shall be factory tested according to the requirements of these standards. The HRV shall be certified for following characteristics:

Mechanical Characteristics

- Casing strength (CS) – D1
- Casing air leakage (CAL) – L1/L2
- Filter bypass leakage (FBL) – F9
- Thermal transmittance of the casing (TT) – T1/T2
- Thermal bridging factor (TBF) – TB1/TB2
- Acoustical insulation of casing

Performance Characteristics

- Air flow - Available static pressure - power input
- Octave band in-duct sound power level
- Airborne sound power level
- Calculated Eurovent AHU Energy Efficiency Class

The (EFF3, TEFC, CLASS F Insulated, VFD Compatible) motors make, country of origin and model no. shall be identified during technical submission and shall be from

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manufacture's best ranking make, most efficient and shall be included in manufacturer's scope of standard.

2-04.2 Construction

Heat Recovery Ventilator shall be Cross Flow Plate Type Heat Exchanger horizontal or vertical with component and configuration as scheduled and shown on the drawings.

Large HRV may be shipped in sections e.g. Fan Section, filter section, Heat Exchange Section for ease of transportation and rigging.

Fan shall be high efficiency (Airfoil/ Backward Curved) mounted on a common shaft. Fan impeller shall be statically and dynamically balanced and shall have permanently lubricated bearings. Fan shall be belt driven with adjustable sheaves. Fan shall have spring isolation from the casing. All fans shall be in accordance with AMCA 210 Standard for performance.

Casing shall be made of sheet steel and finished with baked enamel. (Or approved by the Engineer) The casing shall be double skin with minimum 1-1/2 inch thermal insulation between the skins and removable panel type. HRV shall be equipped with factory fabricated filters and filter boxes with side access door.

Energy Recovery Technology (complete heat recovery latent and sensible) shall be Fixed-plate enthalpy core or polymer membrane with no moving parts for reliability in healthcare settings (no rotary wheels). Material shall be Non-corroding, non-toxic, mold-resistant material (e.g., polymer or coated aluminum). The maintenance of core must be easy without removing and disturbing ductwork. Core shall be washable or replaceable.

Drain Pan: Stainless steel, sloped in all directions, with easily accessible drain connection. Must comply with ASHRAE 170 drainage requirements. Inner pan shall be finished with a factory applied coating of corrosion resistant material. Insulation, adhesive and inner coatings shall comply with NFPA-90A Standard.

Filters shall be at exhaust side installed in HRV, shall be permanent, impingement, dry type, washable, all metal, panel type, at least 2 inch thick unless otherwise scheduled. Media shall be aluminum screen, arranged in alternate layers of flat and herringbone-crimp, 4 layers of each per one inch reinforced and enclosed in a frame of 16 gauge galvanized steel with flush mitered corners. Initial pressure drop at 500 FPM shall not exceed 0.1 inch WG. Holding frame shall be factory-built of 16 gauge steel, with felt air seal. Filters shall be minimum MERV 8 or above, when tested in accordance with ASHRAE Standard 52.

Bag filter in HRV shall be extended surface dry type non-supported pocket, cartridge filter. Filters shall be minimum MERV 14 or above i.e. Average efficiency shall not be less than 95% when tested as per ASHRAE standard 52. Initial resistance at 500 FPM shall not exceed ½ inch.

2-04.3 Spare Parts for Heat Recovery Ventilator

Following spare parts shall be provided as a minimum along with the spares recommended by the Manufacturer.

a)	Fan Belts	01 set for each HRV type
b)	Motors	02 for each HRV type

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2-05 FANS

2-05.1 General

These specifications are for all fans other than fitted inside AHUs and/or FCUs. The characteristics and capacity of all fans be as schedule.

All fans shall be rated as per AMCA standards or ASHRAE standard 51-75 or equivalent. Wheels shall be heavily rigidly constructed and accurately balanced both statically and dynamically, and be free from objectionable vibration or noises. Actual brake horsepower of fan and drive shall not exceed nameplate rating of motor driving fan. Motor shall be included and shall be VFD compatible.

2-05.2 Propeller Fans

Propeller fans shall be direct driven type complete with motor, angle iron frame, back draft dampers and mounting accessories. Blades shall be of steel and factory adjusted for pitch. Blades of back draft damper shall have a link rod and the design shall be such that damper remains in full open position without rattling when the fan is operating.

2-05.3 Tube Axial Fans

These shall be axial flow, duct mounted, circular in shape of characteristics and capacities as scheduled. Fans shall be direct or belt driven as scheduled. Fan motors above 1/2 HP shall be 3-phase induction type and 1/2 HP or smaller shall be single phase split-capacitor. Motors for direct drive fans shall be mounted within fan casing and impeller attached to the motor shaft end. The fan casing shall have flanges with holes for connection to duct work. Fans shall be complete with mounting frames, bolts and accessories, as required.

2-05.4 Centrifugal Fans

These shall be forward curve or back-wardly curved air-foil fan as scheduled, complete with housing, motors, drive equipment, supports, vibration isolators and inertia bases of slide rails as required and as scheduled. Shaft shall be cold drawn, hot rolled or forged steel ground to close tolerances for perfect bearing fit and shall be provided with keys and keyways for impeller hubs and fan pulleys.

Housing shall be heavy gauge steel suitably braced to provide stiffness to housing and rigid supports for bearings. Fan blades shall be continuously welded to back plate.

All bearing shall be cast pillow block, ball or roller bearings, self-aligning type. Bearings shall be selected for 60,000 hours minimum life based on continuous operation at operating fan RPM.

Fan outlet shall be equipped with removable angles and bolts for attaching canvas or other flexible connections. Fan housing shall be provided with access panels and drain plugs.

Centrifugal fans shall be designed to have weatherproof construction and should be suitable for exposed installation.

Smoke Ventilation fans shall be as specified in the equipment schedule and drawings. Motors of such fans shall be of class H type.

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2-05.5 In Line Centrifugal Fans

These shall be centrifugal in line type, of characteristics and capacities as Scheduled. Fans shall be belt driven as Scheduled. Fan motors above 1/2 HP shall be 3-phase induction type and 1/2 HP or smaller shall be single phase split capacitor. Motors for direct drive fans shall be mounted within fan casing and centrifugal impeller attached to the motor shaft end. Motors for belt driven fans shall be mounted on fan casing. Motor base shall be adjustable type with pivot at one end for easy and accurate belt adjustment. The fan inlet shall have an aerodynamic design to ensure turbulence free airflow at discharge. Centrifugal impeller blades shall be backward inclined or aerofoil type. Fan casing and impeller shall be made of heavy gauge steel. Impeller shall be dynamically balanced and shall have cast iron hub. The fan bearings shall be self-aligning ball bearing type. Fan shall have an inner cylinder and belt duct to protect bearings and drive from the air system. Fan motor and drive shall have weatherproof cover. A bolted access shall be provided in the fan casing for cleaning and inspection. The fan casing shall have flanges with holes for connection to ductwork. Fans shall be complete with mounting frames, brackets for ceiling suspension, bolts and accessories, including belt guard and spring vibration isolators as required.

2-06 FILTERS

Flat filters shall be permanent, impingement, dry type, washable, all metal, panel type, at least 2 inch thick unless otherwise scheduled. Media shall be aluminum screen, arranged in alternate layers of flat and herringbone-crimp, 4 layers of each per one inch reinforced and enclosed in a frame of 16 gauge galvanized steel with flush mitered corners. Initial pressure drop at 500 FPM shall not exceed 0.1 inch WG. Holding frame shall be factory-built of 16-gauge steel, with felt air seal. Filters shall have at least 35% efficiency on 0-5 microns range when tested in accordance with ASHRAE Standard 52-76.

2-07 HEPA FILTER FOR DUCTED FLOW

HEPA Filter for ducted flow for application in laboratories shall be of the sizes and characteristics as scheduled and shown on the Drawings.

The filter shall be constructed from fiber glass paper, folded with constantly calibrated spacing using thermos-plastic threads for high dust holding capacity/or low pressure drops. The frame shall be constructed of galvanized steel frame. The filter class shall be H13 or above.

A polyurethane resin which guarantees the seal between the filter pack and the frame. Single piece of cold expanded elastomeric semi-circular gasket shall be applied to guarantee a perfect seal.

The filter shall be provided with housing and complete accessories.

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SECTION 3 - FOUNDATIONS AND SUPPORTS

3-01 GENERAL

All equipment, piping and ductwork where used shall be mounted on or suspended from foundations and supports, all as specified, as shown and as required. All concrete foundations where required, including thickened structural slab, housekeeping pads and concrete for inertia pads will be provided by the Employer or other Contractor appointed by the Employer or HVAC Contractor as described in Special Provisions Clauses SP-02 & SP-03.

Shop drawings, other information and templates for all concrete foundations where used, shall be provided by Contractor as per recommendations of the manufacturer of the equipment. Necessary integral steel framings, concrete reinforcing rods welded to frame, required anchor bolts, spring mountings, and neoprene pads, shall be provided by the Contractor. The Contractor shall cooperate with those doing the flooring work to ensure proper installation of all these elements.

Foundations and vibration isolation mountings for various equipment, piping, and ductwork where used shall be as per requirements specified. Vibration isolators where used shall be of approved make.

Springs used for vibration isolation shall be single, open coil type and laterally stable, having a rabo of loaded height to mean coil diameter not greater than 1.25. To preclude possibility of spring coils "shortening" when motor starts or slows down, the springs shall be selected so that there remains when the spring is design loaded, a reserve deflection of between 25 and 30% of maximum deflection of free spring. When fully compressed, maximum stress in steel should not exceed yield stress of spring material. Springs shall be unhoused and held well clear of any part of suspended mass. Isolated system if supported on a flat slab type base shall be held clear of supporting structure or pad by the minimum distance thought necessary for efficient housekeeping or 1 inch. Lower end of each spring shall be supported on a rigid, square steel base plate sufficiently thick to withstand a bearing pressure of 427 kPa. This plate should be complete with 3 thickness of type W neoprene waffle pad between under inside of plate and supporting structure. A 16 gauge steel shim plate bonded to pad surfaces shall separate adjacent thicknesses. Spring base plate shall also be bounded to top layer of pad. Pad area should be chosen to suit hardness of neoprene. For 40 durometer neoprene, bearing pressure on supporting structure shall be 276-352 kPa when spring is design loaded. Waffle pads may have to be cut away in the middle of pads since pads shall have same overall dimensions as spring baseplate.

All pipe hangers must be insulated from the building by cork inserts between the hanger bar fixing and the connection to the structure. Details of the Contractor's method of achieving this shall be submitted to the Engineer for approval. All ceiling hung equipment having fans and motor as integral part of equipment shall have adequate vibration isolators.

All ceiling hung equipment having fans and motor as integral part of equipment shall have adequate vibration isolators.

Flexible duct connections, as specified elsewhere, shall be fitted wherever ducts cross building expansion joints, at suction and discharge end of each air handling unit and fan wherever ducts are connected to such unit, and/or wherever shown on the drawings. Supply outlet of concealed ceiling-mounted fan coil unit shall also be connected to Fan-coil with flexible connection.

Details of all vibrabon isolators, flexible connections and bases shall be submitted to the Engineer for approval.

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3-02 MOUNTING OF EQUIPMENT

3-02.1 Floor or Roof Mounted Equipment

All floor or roof mounted equipment shall be generally placed on at least 4 inch concrete housekeeping pads, unless otherwise indicated. The pads shall be constructed on 1 inch thick cork-sheet. Protective curbs shall be provided on all sides of the pad to protect the cork sheet edges. Special attention shall be given to the equipment at roof and intermediate floors and heavy equipment like Pumps and Chillers shall be mounted on spring isolators / inertia pads. The spring isolators shall preferably be supplied by equipment manufacturer and shall be from manufacturers specializing in manufacturing of vibration isolators. Manufacturer's recommendations for prevention of vibration and noise travel to the structure shall be adopted. The foundation details shall be subject to the approval of the Engineer.

3-02.2 Wall Mounted Equipment

All equipment installed through wall shall have 20 gauge galvanized sheet metal which shall remain in place permanently. Sleeves shall be packed with non combustible glass fiber insulation minimum of 1.5 lb/cu.ft density and sealed with sealant. Equipment installed through walls shall have supporting wall brackets.

3-02.3 Air Inlets/Outlets

All wall grilles/EA-OA louvers shall be fixed to wooden frames and not to the ceiling material/wall masonry. Metallic frames may be used with metallic frame false ceilings. Wooden wall frames shall be grouted and finished by Contractor.

3-02.4 Ceiling-Hung Equipment

All ceiling-hung equipment shall be hung from ceiling (concrete slab) and shall not rest on false ceiling.

3-02.5 Floor Mounted Equipment

All floor-mounted equipment shall be resting directly on the raised floor pad (or supported from wall when approved by the Engineer).

3-03 VIBRATION ISOLATION

Vibration isolation bases shall be provided and installed under all pumps, to prevent the transmission of vibration to the building structure, as shown on Drawings.

Where fans and motors are integral parts of factory assembled air handling units and the fans and motors are not spring isolated from the air handling unit, the entire unit shall be mounted on vibration isolators.

Inertia pads where indicated shall be reinforced cement concrete pad, at least 4 inch thick with 4 inch steel channel all around to protect concrete edges. Reinforcing rods shall be welded to channel frame.

Floor mounted Fans with belt drives shall be mounted on continuous rails with sliding base for motor adjustment and fan-rails shall be mounted on vibration isolators as specified above. When shown on Drawings, continuous rails shall be mounted on inertia pads and pads shall be mounted on vibration isolators.

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SECTION 4 - DUCTING AND SHEET METAL WORK

4-01 GENERAL

4-01.1 Ducting Material

All duct work shall be of galvanized steel sheet unless otherwise indicated on Drawings. Galvanized steel shall be of lock forming quality (LFQ). The GI sheet shall conform to ASTM A-525 and ASTM-90.

Galvanized steel sheet shall be Cut Lengths coated by the Hot-Dip Method and manufactured per ISO Standard 3575-76 zinc coating designation Z-275, and base metal quality 02.

4-01.2 Structural Steel

Structural Steel shall be M.S. members rolled from Pakistan Steel billets or equivalent conforming to ASTM designation A-36 standard specifications for structural steel.

4-01.3 Canvas Cloth

Canvas Cloth shall have specified weight with flame retardant quality.

4-01.4 Painting

All steel work in connection with supports for ductwork etc. exposed to the elements is to be painted with two coats of an approved rust preventive paint.

All exposed metal surface of hangers, brackets, etc. must be painted with two under-coats and two finishing coats of enamel paint of approved colour. G.I. sheet is not to be painted. However, all uninsulated pipe work and valves are to be painted as stated above.

Identification bands shall be painted on uninsulated ducting, or on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

All duct hangers in concealed locations shall be given one coat of black asphalt paint before being concealed.

4-02 DUCT CONSTRUCTION

All sheet metal duct work shall be of a standard construction and erected in a first class workmanlike manner. The duct work shall be constructed as per SMACNA Low Velocity Duct Construction Standards.

Where specified, duct work shall be provided with interior insulation. Ducts shall be straight and smooth on the side, with joints neatly finished. Where ducts are lined with interior insulation, the dimensions required shall be for the net free area after insulation is applied. Ducts shall be anchored securely to the structure in an approved manner and shall be installed so as to be completely free from vibration under all conditions of operation.

Sheet metal ducts shall be properly braced and reinforced with steel angles, or other structural members approved by the Engineer Unless otherwise required, the internal ends of all slip joints shall be installed in the direction of flow.

Finished work shall show no flaking or peeling within 1/4" of a cut edge. The construction and gauge of material, size and spacing of stiffeners for duct work shall be as follows:

Larger Dim. of Duct (in.)	Gauge (US)	Traverse Joint Type/Size (inch)	Interm Bracing, Angle Size (inch)	Max. Spacing between Traverse Joint &/or Interm Reinforcement

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Thru 12	26	Drive slip/-	-	-
13 thru 18	24	Drive slip/-	-	
19 thru 30	24	Pocket lock/1	1x1x1/8	5
31 thru 42	22	Pocket lock/1	1x1x1/8	5
43 thru 54	22	Pocket lock/1-1/2	1-1/2x1-1/2x1/8	5
55 thru 60	20	Pocket lock/1-1/2	1-1/2x1-1/2x1/8	5
61 thru 84	20	Angled reinforced standing seam	1-1/2x1-1/2x1/8	5
85 thru 96	18	Angled reinforced standing seam	1-1/2x1-1/2x1/4	2.5
Over 96	18	Angled reinforced standing seam	1-1/2x1-1/2x1/4	2.5

Other types of Traverse joints allowed as per ASHRAE/ SMACNA Standards shall be acceptable, subject to Approval of Engineer, in places where pocket lock is not possible due to tight space.

All angles for bracing shall be painted with one coat of approved rust-inhibitive paint before fixing to duct.

All duct work in the finished areas shall be run parallel to the beams wherever possible. All outlet opening and open ends shall be kept closed with sheet metal caps during construction. Rectangular duct shall be constructed by breaking the corners and grooving the longitudinal seams. Elbows and transformation sections may be formed with Pittsburgh corner seams but complicated fittings shall be constructed with double seams. Angle bracing shall be of steel and shall be carried out on all four sides of the ducts. All bracing is to be in accordance with the current addition of the ASHRAE Hand Book/ SMACNA Standards.

4-03 ELBOWS

Ducts shall be built with curves and bends, where required, to affect an easy flow of air. Curved elbows shall have a centre line radius at least equal to 150% of the width of the duct unless otherwise indicated. All duct curves having an inside radius smaller than the width of the curve shall be equipped with approved single thickness vanes.

Vertical ducts shall have full size bends where horizontal branches are taken off unless otherwise indicated, and/or approved.

Where square elbows are used in changing directions, approved and aerodynamically correct vanes as per latest SMACNA Duct Construction Standards shall be used.

These turning vanes must be free from vibration when the system is in operation.

4-04 HANGERS

Hangers and supports shall be fastened to the structure in a manner approved by the Engineer. All fastening shall be such as to ensure permanent stability and to be capable of supporting at least three times the applied load.

Galvanized sheet metal ducts less than 20" in width (larger dimension) may be suspended by means of galvanized iron straps extended along the bottom of the duct to form a trapeze, only if hanger length above the duct is not more than 12".

All other ducts shall be suspended by means of iron bars securely fastened to the angle iron bracing or angle iron placed under the duct. Bars shall be fastened to bracing only on un-insulated ducts.

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Bars shall be welded to angles at ceiling, attached therein by anchor screws and heavy iron washers. Where horizontal ducting is fixed to walls, columns, supported from floor slabs, etc. angle iron frames are to be fabricated and fitted to support rectangular ductwork and associated equipment.

Vertical ducts are to be supported by steel angles bolted to at least two sides of the duct and on the complete circumference of the ducts where the larger duct dimension is greater than 24 inch.

Angle iron extensions shall be either grouted or bolted to the structure. Hangers spacing and sizes shall be as follows.

Larger Duct Dim. (Inch)	Strap Size (Inch)	Bar Dia (Inch)	Bottom Angle Size (Inch)	Maximum Spacing (Feet)
Thru 12	1" x 22 ga.	3/8	1x1x1/8	8
14 thru 18	1" x 22 ga.	3/8	1-1/4x1-1/4x1/8	8
19 thru 30	1" x 18 ga.	3/8	1-1/2x1-1/2x1/8	8
31 thru 42	1" x 18 ga.	3/8	1-1/2x1-1/2x1/8	8
43 thru 54	1" x 16 ga.	3/8	1-1/2x1-1/2x1/8	7
54 over	1" x 16 ga.	1/2	2x2x1/4	6

Hanger rods shall be cross-braced whenever the length of rod above duct work is more than 3 ft. to prevent swing of ducts.

All structural steel including hanger rods and angle iron shall be painted with one coat of approved rust- inhibitive paint before installing.

4-05 QUADRANTS FOR VOLUME DAMPERS

All dampers other than dampers behind registers and diffusers shall be fitted with substantial locking quadrants, mounted outside the duct in an accessible position. On insulated ducts the quadrants shall be fastened to bearing plates flush with the outside finish of the insulation.

4-06 DAMPERS

4-06.1 Volume Dampers (V.D)

A substantially constructed manual volume damper of the butterfly or multiple blade type as per latest SMACNA Duct Construction Standards shall be fitted where shown on the Drawings and at all branch entries or exits with main ducts for balancing purposes. Dampers shall have galvanized or painted steel interlocking blades of 8" maximum blade width. Blades shall be fabricated from 16 gauge steel with seamed edges and a maximum length of 4 ft. It should be noted that these dampers, shall be separate and independent from the dampers, hereinafter specified. Volume Dampers are not required where splitters Dampers, as specified hereinafter, are installed.

4-06.2 Splitter Dampers (S.D)

At each point of division in a supply trunk duct where a branch is taken off a trunk duct, an adjustable splitter or deflecting damper, one gauge heavier than the duct with operating rod and locking quadrant as above, shall be installed. These deflecting dampers shall be permanently set and locked in position after completion of the installation and adjustment with fans running.

Operating rods are to be full blade length extending through the duct to externally mounted bearing plates. Construction shall be as per latest SMACNA Duct Construction Standards.

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4-07 ACCESS DOORS AND PANELS

Wherever necessary, suitable access openings, doors and frames to permit inspection, operation and maintenance of all filters, controls, dampers, bearings or other apparatus shall be provided in ducting. Doors shall be of double construction, of not lighter than 20 gauge metal sheet and shall have sponge rubber gaskets around their entire perimeter. On insulated duct work the space between the inner and outer door sheets shall be insulated as specified for the ductwork. All access doors in sheet metal shall have air tight seal, shall be hung on heavy flat hinges and shall be secured in the closed position by means of wing type nuts and screws or coin operated catches.

4-08 SLEEVES

Where ducts pass through walls, partitions, or floors, wooden sleeves shall be provided by the Contractor and these sleeves shall remain in place permanently. Sleeves shall be packed with non-combustible glass- fibre insulation, minimum of 1.5 lbs/cu.ft. density and sealed with sealant.

4-09 TEST WELLS

The Contractor shall provide test wells for measurement of air velocity and static pressure for balancing purpose. These wells made up of a brass nipple with screwed caps are to be fixed into the duct or casing on the downstream sides of each fan. The design of test well shall be subject to Engineer's approval.

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SECTION 5 – INSULATION

5-01 GENERAL

5-01.1 The Contractor shall provide insulation for the services and equipment specified hereafter. Insulation shall be as per following Insulation Schedule.

5-01.2 Insulation material shall be complete with vapor barrier protection covering and jacketing (where specified), adhesives, insulation tape, duct sealer and/or sealing tape, fastening material, and jacketing for outdoor ducting and piping.

5-01.3 Identification bands shall be painted on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

5-02 Insulation Schedule

Sr. No.	Services	Thick-ness (Inch)	Insulation Type	Vapour Barrier	Protection
a)	Indoor supply/return duct				
i)	Concealed to vision outdoor-air duct passing through conditioned space and equipment room	2	Glass fiber blanket	Reinforced aluminum foil	8-Oz canvas
ii)	Exposed to vision outside air duct	2	Glass fiber blanket	Reinforced aluminum foil	4-Oz canvas with water proof paint and jacketing
iii)	Supply ducts up to 10 feet from fan discharge and sheet metal air plenums	1	Acoustic liner applied inside with outside insulation as Item 5-02 (a) (i,ii)	Same as above	
b)	Refrigerant Piping				
i)	Indoor	3/4	Class-O type Elastomeric extruded Nitrile Rubber tubing to fit standard dia meters of copper tubing	Reinforced aluminum foil	Approved tape
ii)	Outdoor	3/4	Class-O type Elastomeric extruded Nitrile	Reinforced aluminum foil	Approved tape weather proof type

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			Rubber tubing to fit standard dia meters of copper tubing		
c)	Cooling coil condensate drain piping	1/2	Nitrile Rubber	Reinforced aluminum foil	–

5-03 INSULATION MATERIALS

5-03.1 Duct Insulation

Insulation material for ducts and sheet metal air plenums shall be flexible glass fiber, 1.0 lbs/cu.ft. Density and maximum conductivity of 0.27 Btu/hr.sq.ft./inch at 75 deg.F or closed cell foam type 3.5 lbs/cu.ft Density and maximum conductivity of 0.27 Btu/hr.sq.ft./inch at 75 °F.

5-03.2 Vapour Barrier for Duct Insulation

Vapour barrier when specified shall be factory applied flame retardant reinforced aluminum foil, 0.02 mils thick.

5-03.3 Cooling Coil Condensate Pipe Insulation

Shall be 1/2" thick pipe insulation as mentioned above with aluminum foil self adhesive tape 3" wide.

5-03.4 Acoustic Liner Material

Acoustic liner shall be 1.5 lbs/cu.ft. Density fiber-glass with neoprene scrim on inside surface and thermal conductivity value shall not exceeding 0.27 Btu/hr.sft °F /inch at 75 Deg F. Material shall conform to TIMA Standard AHC-101-1975 with latest revisions.

5-03.5 Insulation Protection Material and Accessories

5-03.5.1 Canvas

4 Oz or 8 Oz per square yard as specified in Insulation Schedule.

5-03.5.2 Jacket

26 gauge (US) galvanized steel sheet or aluminum sheet.

5-03.5.3 Water & Rat Proof Paint

As approved by the Engineer.

5-03.5.4 Wire Netting

1" hexagonal mesh, 20 gauge (US), galvanized.

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5-03.5.5 Metal Lathe

Expanded metal lathe with 1/2 inch diamond mesh.

5-03.5.6 Banding

1/2" x 1/48" galvanized steel or aluminum bands.

5-03.5.7 Insulation Tape

Insulation tape for joints shall be of aluminum foil type, 2 inch wide, equivalent to Scotch No.473.

5-03.5.8 Adhesive

Adhesive for thermal insulation shall comply with ASTM Standard C 916-79 or equivalent. Adhesive for acoustic liner shall comply TIMA Standard AHC-101-1975 or equivalent.

5-03.5.9 Duct Sealer

Sealer for duct joints shall be butyl rubber caulking, weather proof and water resistant, conforming to U.S. Federal Specification TT-S-001657 Type 1, as manufactured by Woodmont Products, INC, USA, or approved equal.

5-03.5.10 Duct Sealing Tape

Duct sealing tape shall be 3 inch wide self-adhesive vinyl cloth tape.

5-04 INSULATION APPLICATION

5-04.1 General

All Thermal and acoustic insulating materials shall be installed as specified hereinafter.

Insulation shall be installed in a smooth, clean, workmanlike manner and joints shall be tight and finished smooth.

All surfaces to be insulated shall be dry and free from loose scale, dirt, oil or water when insulation is applied. Insulation shall be applied in such a manner that there will be no air circulation within the insulation or between the insulation and the surface to which it is applied.

Surface imperfections in the insulation such as clipped edges, small joints or cracks and small voids, or holes not over 1 inch square shall be filled with like insulating material.

Where a vapour barrier is fixed on site it shall be fixed in such a manner as to obviate the possibility of moisture penetration. It shall be fixed where required by means of an approved type bituminous compound or approved equal for tightness.

Insulation for all services shall only be applied until after testing and approval for tightness obtained from the Engineer, unless otherwise instructed in writing by the Engineer.

Insulation for all services shall be continued through sleeves. The insulation on exposed risers shall extend through the floor. Where insulated pipes are indicated on

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drawings as embedded in the thickness of walls, the insulation thickness may be reduced to 1 inch only

Insulation is to be applied where indicated on the drawings or called for in these specifications.

5-04.2 Duct Insulation

Before applying insulation, either sealing tape or duct sealer shall be applied on all corners of traverse joints for air tightness.

The insulation shall be fixed on ducts with a suitable adhesive as specified. Adhesive shall be applied on at least 75% surface area. In addition to the fixing by adhesives, insulation on the underside of ducts exceeding 18 inch width must have mechanical fasteners of an approved pattern to prevent insulation sagging, or alternatively bands as specified above shall be used at intervals not exceeding 4 feet.

All joints on the insulation shall be sealed with 2 inch aluminum foil tape. The tape shall only be fixed to the vapour seal and not to the bare insulation and, therefore, joints in the insulation shall not occur longitudinally at corners of ducts. If it is unavoidable to have joints at longitudinal corners then the insulation must be cut back and the vapour seal folded over the bare edge of the insulation so that the tape adheres only to the vapour seal.

5-04.3 Duct Insulation Protection

Indoor Exposed Duct: Insulation shall be covered over the vapour seal with a single layer of canvas with generous overlaps. The canvas shall be fixed with an approved adhesive.

5-04.4 Condensate Drain Piping

Self adhesive pipe insulation tape, as specified above, shall be spiral-wrapped around pipe, with 50% overlap.

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SECTION 6 - ELECTRICAL EQUIPMENT AND CONTROLS

6-01 SCOPE

a) The Contractor shall supply all panel boards, starting equipment, circuit breakers, busses, isolators, conducting cables, wiring, conduits, earth conductors, etc., for the entire HVAC system.

b) The earthing system shall consist of supply and installation of earth continuity conductor and running earth conductor all along the cable length. All material such as earth continuity conductors, earth connecting points, including the installation material and accessories shall be supplied and installed by the Contractor as specified.

c) For further details refer to Clause 6-02, "Distribution and Control Scheme".

6-02 DISTRIBUTION & CONTROL SCHEME

HVAC Contractor shall furnish and install electrical panel ACPs as specified.

All HVAC equipment shall be served by ACPs.

The HVAC Contractor will furnish and install incoming cables with circuit breaker from building electrical panel at roof floor sized to handle total HVAC connected to these panels.

All electrical works upstream and downstream of ACPs shall be in HVAC Contractor's Scope of Work.

6-03 GENERAL

All electrically operated equipment shall comply in all respects with the relevant B.S Standards including dimensional standards where these exist, except in so far as this Specification is at variance therewith.

All electrically operated equipment shall be so designed that it will continue to function without damage to itself or otherwise, if the voltage and/or frequency vary within the following tolerances.

- Voltage plus or minus TEN percent.
- Frequency plus or minus SIX percent.

The entire installation shall be in accordance with the requirements and to the entire approval of the Electricity Department of the Government and the approval of the Engineer.

In general, all electrically operated equipment shall be suitable for continuous and prolonged operation in an ambient temperature of 40°C. This temperature makes no allowance for local rises in air temperatures due to the operation of the equipment itself or of heat produced in or by adjacent equipment such as compressors, condensers or heaters. The maximum operating temperature in standards specified shall be observed. Allowance for local high ambient temperature shall be made by reducing the permitted rises of temperature above ambient.

6-04 ELECTRICAL MOTORS

Unless otherwise indicated in these Specifications or in the Schedules, all motors which are not factory supplied by equipment manufacturer shall be totally enclosed fan cooled, of squirrel cage construction and of approved manufacturer. All such local manufactured motors shall be of Siemens make or approved by the Engineer.

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Insulation on all motors shall be equal to Class F (IP 55). The efficiency of motors shall not be less than IE-3. All motors shall be designed for continuous operation in the ambient temperature as mentioned in the respective equipment schedule or specifications.

All motors and accessories such as protection and control devices etc. shall comply in all respects with NEMA, current B.S. Standards and I.E.E. Regulations. Single phase motors shall be capacitor-start induction run construction, unless otherwise indicated or specified.

All motors shall be quiet operating guaranteed to fulfill specified requirements without producing any sound audible outside of plant rooms. All belt- driven motors shall have adjustable bases and set screws to maintain proper belt tension, with proper belt guards. Motors installed in the building should be super silent sleeve bearing type.

The starting current of all motors above 10 hp shall not exceed twice its rated full load current. For motors of rating 10 hp. and below the starting current shall not exceed 7 times its rated full load current or one hundred amps. per line, whichever is larger.

6-05 MOTOR STARTERS AND ISOLATION

Each three phase motor shall be provided with a protective automatic starter to disconnect the supply in case of:

- Failure of the supply
- Serious drop in voltage
- Flow of excess current
- Failure of any phase (single phasing)

All starters shall be properly de-rated for operation in an ambient temperature of 105 °F (40 °C).

Manual starters may be used for motors 1/2 hp and less and shall include thermal overload protection and disconnect switch. These should only be used when no automatic switching is intended.

DOL starters shall be used only on motors of 10 HP and less.

All motors, control gear and ancillary equipment shall be protected by H.R.C. fuses or circuit breakers in addition to the protective starter mentioned above. Such fuses shall be part of the control gear. The isolator shall be integral with control gear.

Single phase motors shall be protected by circuit breakers with overload protection. Where several starters are mounted in a panel rack or bank, each starter shall have separate H.R.C. fuses or circuit breaker isolator. Manual starters for single phase motors should only be used when no automatic switching is intended.

Where starter operating circuits and ancillary apparatus are energized by an auxiliary supply other than the main power circuit to the motor the isolator shall incorporate auxiliary contacts to effectively isolate all poles of phases of such auxiliary supplies. Where necessary, two isolators shall be used.

All starters not in a central panel shall have a sheet metal enclosure with a removable lid and cover and necessary brackets for mounting on panel or wall. A clear schematic diagram of the starter circuit shall be fixed inside the cover of each starter.

All magnetic starters subject to manual start shall have momentary contact start and stop buttons built into cover. All magnetic starters subject to electrical interlock or

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automatic control shall have hand-off automatic switches built into cover.

All coils, cores, insulation, contacts and trippers to starters and relays and all parts subject to wear and arcing shall be renewable.

6-06 POWER AND CONTROL WIRING

All power wiring from the point of supply as described in previous sections to each equipment shall be carried out by the HVAC Contractor. All control wiring from each equipment to applicable control panels and Control System shall also in scope of HVAC contractor.

All conduits supplied by the Contractor for power and control wiring shall be of heavy gauge 16 SWG steel, manufactured and tested in accordance with BS 31.

The conduit shall be protected by two base coats of red oxide anti-rust paint and finished in first quality black enamel paint.

The conduit accessories, such as sockets, elbows, bushings, bends, etc., required for installation of conduit shall be furnished by the Contractor. The accessories shall conform to the same quality and specifications as for the conduits. All outlet boxes, inspection boxes, junction boxes, saddles, clamps etc., wherever required shall be provided by the Contractor.

Flexible steel conduits shall be installed at termination to equipment which is subjected to vibration. The flexible conduit shall consist of single-strip galvanized steel which shall be spirally wound, dust tight, mechanically continuous and strong. Where necessary, flexible conduit shall be adequately supported. All accessories for installation of flexible metal conduit shall be provided with an overall rubber covering. At all terminations, the conduit shall be held firmly in position by approved type of glands.

All LT cables for power and control system shall be copper conductor, PVC insulated for single core and PVC insulated PVC sheathed for multi-core. All cables shall be of specified voltage grade complying with BS 6346 and/or BS 6004. The PVC insulation shall comply with BS 6746. Conductor shall be stranded or solid high conductivity soft annealed copper complying with BS 6360.

All multicore and single core sheathed cables for circuits operating up to 250 volts shall be 300/500 volts grade. All single core unsheathed cables shall be of 450/750 volt grade.

All power cables for main feeders, main to sub-main feeders, power equipment, etc., shall be multi-core copper conductor, armored or unarmored and shall be of 600/1000-volt grade.

All cables shall have phase identification colors on insulation of each core. The colour code for three phase circuits shall be red, yellow and blue for phase conductors and black for neutral conductor. Where insulated earth conductor is installed, it shall have green or green and yellow insulation.

Single-phase circuits shall have red for phase and black for neutral conductor.

While cable selection for the specified project, the power factor is required to be considered as 0.8.

All DC circuits shall have red for positive and black for negative conductor.

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6-07 CABLE TRAY SYSTEM

The Contractor shall discuss the layout with the Engineer and co-ordinate at Site with other services for exact route, location and position of the cable trays for electrical lines. It must be noted that the extent of works shown on the drawing does not indicate the exact position of cable trays. The Contractor shall ensure exact location and route of cable trays in coordination with other services drawings, as per site requirements and as directed by the Engineer.

6-07-02 Products

The cable tray system shall be of one manufacturer and shall include factory-made trays, tray fittings, connectors and necessary accessories and supports to form a complete cable support system.

The cable tray system shall include the following factory - made tray elements:

a) Straight cable trays and ladders
b) Fittings as horizontal and vertical bends of various angles, crosses, tees, wyes, reducers, vertical riser elements
c) Connectors
d) All necessary fixing accessories.

Manufacturer's standard accessories shall be used and site fabrication shall not be permitted.

Horizontal run of cables laid on cable tray and exposed to direct sunlight shall be provided with covering at higher level to allow for ventilation.

6-07-03 Materials

The whole of the tray work, trays, fittings, supports shall be of mild steel hot dipped galvanized after manufacture to BS 729. The thickness of the protective sheath on any element shall not be less than 55 microns.

Cable trays shall be constructed from mild steel hot dip galvanized and of minimum thickness of 1.5mm.

Insert elements, bolts, screws, pins, etc., shall be mild steel cadmium plated.

Tray work shall have oval perforations. Ladder type trays shall be used for vertical runs as approved by the Engineer.

All trays (straight and fittings) shall be welded construction and be a heavy duty returned-flanged, perforated type, unless specified otherwise. The minimum thickness of heavy duty returned flanged cable trays shall be 1.5mm.

Tray components shall be accurately rolled or formed to close tolerances and all edges rounded. Flanges shall have full round smooth edges.

Ladder racks shall be of similar construction. The rungs shall be spaced at maximum 300 mm. The system shall allow for installing additional rungs and for replacement of rungs.

For all trays, flanges shall be a minimum of 50 mm deep, unless otherwise specified.

Cable tray width and radius of curved sections shall be selected to suit the number of cables as shown on drawings and to the approval of the Engineer.

Cable trays and accessories installed in hazardous and extremely corrosive environments shall be heavy duty GRP or 316 S31 grade stainless steel.

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6-08 APPARATUS CONTROL PANELS (ACPs)

The panel shall be of sufficient size and dimensions to house various equipment for the installation. The panel shall be provided with lock and double set of keys. The panel shall be minimum of 14 gauge steel painted with powder coating inflammable paint. It shall be of the unit construction single fronted or double fronted type. It will be constructed such that doors are interlocked, preventing access to the devices installed inside without switching off the Main Circuit Breaker on incoming line.

This panel will contain the following equipment (but not limited to)

Circuit breaker on incoming line.
Circuit breakers, one for each outgoing line.
Starters with thermal overload protection for equipment which does not have factory supplied and/or equipment-mounted starter.
Relays, toggle switches, push button stations, hand-off-auto (HOA) switches - Labels on all components.
Terminal strip.
Relays and other devices for Temperature and Automatic Controls furnished by Controls Manufacturer for field installation.
Pilot lights, one for each starter, red for equipment operating.

All internal wiring and accessories clipped individually to the panel and arranged parallel or at right angles.

All indications shall be visible from the front of the panel. Prior to installation, the contractor shall submit for approval of the Engineer the electrical diagram of the whole installation and the suggested electric panel layout showing samples of instruments and components.

6-09 LOCAL ISOLATING SWITCHES (LIS)

The Contractor shall provide local isolating switches moulded-case type enclosed in metal boxes for disconnecting all power to the equipment in emergency and during maintenance, for all equipment controlled by remote MCC or ACP. These switches shall be installed near the equipment within visual range and shall be weather proof for outdoor installation.

6-10 COMPONENTS

The HVAC panels shall be provided with all components as specified and as necessary for the satisfactory operation of the HVAC system. Typical specifications are given hereunder:

6-10.1 Bus Bars

The bus bars shall be made of high conductivity electrolytic copper and shall be completely isolated and mechanically braced for the specified fault level. The phase identification of bus bars shall be by colors applied on full length of bus bars 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 triple pole. The neutral and earth shall be of appropriate size to meet the electrical and mechanical requirements of the system. The temperature rise shall not exceed 45 degrees centigrade at rated current.

6-10.2 Circuit Breakers

The circuit breaker shall be triple pole, molded case, manually operated type with

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front drive grip handle. ON-TRIP-OFF indication shall be provided on all circuit breakers. The circuit breakers shall have the following protections and setting range unless otherwise shown on the drawings:

- Adjustable three poles, manual reset thermal overload release of setting range 80 to 100% of rated current.
- Magnetic triple pole short circuit release having range according to manufacturer's standard range.
- The incoming circuit breaker shall have two numbers each of potential free normally open and closed auxiliary contacts rated for 2 Amp, 230 VAC. The incoming circuit breaker shall also have ON, TRIP and OFF indicating lamps. The circuit breaker shall have specified rupturing capacity, without the use of back-up fuses. Auxiliary release and trip coils shall be provided for desired operation and/or interlocking as required.

6-10.3 Push Buttons

Push Buttons shall be momentary make/brake contact type (normally open/normally close). These shall be suitable for flush mounting. Push Buttons shall have round/square head. These shall have red and green colors for 'ON' 'OFF' switching operation respectively.

6-10.4 Selector Switches

Ammeter and voltmeter selector switches shall be complete with front plate, grip handle, and R-Y-B and OFF position for ammeters and RY-YB-BR-RN and OFF position for voltmeter.

6-10.5 Air Break Contactors

The contactor shall be air break, triple pole, 400V AC suitable for the type of duty to be performed. The main contacts shall be silver tipped, butt type with double break per pole. Each contactor shall be provided with 230 VAC single phase operating coil, and minimum two normally open and two normally closed auxiliary contacts wired upto terminals. The number of working auxiliary contacts shall be provided according to the system requirements.

6-10.6 Indicating Lamps

Indicating lamps shall be suitable for flush mounting, complete with base, 230 volt incandescent lamp and shall have rosettes of suitable colour (green for ON, Red for OFF and Amber for TRIP).

6-10.7 Line up Terminals

Line up terminals wherever provided for control or power circuits shall be suitable for voltage and size of conductors.

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.

6-10.8 Current Transformers

Air cooled, ring type current transformers shall be provided having transformation ratio as required. The current transformers shall be of suitable burden having accuracy class 1.0 and have 5 amps secondary.

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6-10.9 Load Break Switches

Triple pole rotary 500 Volts AC on-load isolating switches of current rating as specified shall be provided complete with front drive grip handle and front plate.

6-10.10 HRC Fuses

HRC fuses shall be provided complete with fuse bases, fuse etc. The fuses shall have a fusing factor as specified for class Q1.

6-10.11 Control Selector Switches

The selector switches for lights and other controls shall be rotary cam type, having required number of positions, complete with knob and front plate with position indication.

6-10.12 Labels

Each equipment on the panel shall be identified by a nameplate. Metallic nameplate with 6mm high etched letters shall be attached to the panel or integral with it. Lettering shall be cut into the plate to a depth of not less than 0.4 mm and shall show a contrasting colour produced by filling with enamel or lacquer. Painting of lettering directly on the surface of the plate or panel will not be permitted.

6-10.13 Outdoor Installation

All ACPs mounted outdoor or on roof shall be of weather proof construction minimum IP 54 rated suitable for operation at 50°C ambient temperature condition.

6-11 EARTHING

6-11.1 General

For scope of work refer to **clauses 6-01 and 6-02.**

All HVAC equipment with electricity connection and all ACPs and LISs panels shall have their frames, carcasses and all metal parts not normally carrying current, effectively and continually connected to the general mass of the earth. Each equipment and panel shall be separately connected to a main earth continuity conductor.

6-11.2 Earth Continuity Conductors

Earth continuity conductor shall be round, hard drawn, bare electrolytic copper wire of appropriate sizes as approved by the Engineer. All fixing accessories, earthing clips, sweating sockets, lugs, thimbles, etc., shall be provided for a complete earthing installation.

6-12 CONDUITS AND CONDUIT ACCESSORIES

6-12.1 Material Description

The conduit for wiring shall be of polyvinyl chloride material for use in concealed to vision locations and G.I. pipe in exposed locations including vertical shafts. All other accessories shall be subject to Engineer's Approval.

6-12.2 Application of PVC Conduit

Manufactured smooth bends shall be used where conduit changes direction. Bending of conduit by heating or otherwise shall be allowed at special situation only, for which

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approval of Engineer shall be necessarily required. The use of sharp 90 degree bend and tees shall not be allowed. The bends shall have enlarged end to receive conduit without any reduction in the internal diameter at joint. Round Junction Boxes shall be provided with one piece PVC Cover plate which shall be installed on the box by means of galvanized screws. Pull box shall be installed in conduit runs, wherever required to limit the pulling length of cables. Pull Boxes should be installed in conduit runs to limit the pulling lengths as required. The rectangular inspection or pull boxes shall be 16 S.W.G. thick sheet steel having nipples to receive PVC conduit with force fit. The sheet steel box shall be painted inside and outside with black enamel paint over a base coat of red oxide antirust paint, as approved by Engineer. The minimum length of inspection box shall not be less than four times the cables manufacturer's recommended bending radius of the cable. Bushes shall be used at pipe terminations and PVC solution for jointing of pipes.

The PVC conduit used inside the walls and concrete shall be of Class-D and the conduit being used in open space and ceilings shall be of Class-B.

6-12.3 Application of G.I. Conduit

Application of G.I. conduit shall be similar to PVC conduit as specified above, except that pipes shall have threaded socket connections. Pipes and fittings shall be as specified in Piping Section, finished with 2 coats of aluminum paint.

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SECTION 7 - AIR INLETS AND OUTLETS

7-01 GENERAL

Before placing orders for these items, the Contractor shall check that all items to be supplied by the manufacturer comply for spread, throw, drop and noise, with capacities and characteristics as indicated on the drawings and schedules. All outlets shall be specifically selected for their particular application and designed for quite operation. All items are to be approved by the Engineer.

All air inlets/outlets shall be of material as indicated on the Drawings and Schedules, and/or as specified.

Colour and finish shall be subject to Engineer's approval. Ceiling diffuser face and margin sizes and styles shall be coordinated with false ceiling/boxing type. All devices shall have substantial approved gaskets to completely prevent streaking on walls or ceilings due to leakage.

Where ceiling panels and ceiling diffusers are of different size, ceiling diffuser shall be centered in ceiling panel. Duct routing may slightly be adjusted, if necessary, for this purpose or duct drops for diffuser necks may be offset upto a max. of 30 degrees, or diffuser locations having requirement of greater than 30 degrees offset, flexible round insulated duct connection shall be used.

All wooden frames for wall inlets/outlets (where not mounted directly on the duct) shall be 3/4" thick set permanently in the walls. These frames shall be provided by the Contractor. The Contractor shall be responsible for all cuttings of walls, fixing of wooden frames in walls and repair of masonry/plaster required for fixing side-wall inlets/outlets. The Contractor shall furnish wooden frames for wall inlets/outlets to those responsible for civil construction for installation at locations indicated on shop drawings prepared by the Contractor for this purpose.

Ceiling inlets/outlets shall not be supplied on false-ceiling. Cuting of false ceiling (tiles) shall be the responsibility of the HVAC Contractor.

Manufacturer's certified free area for each type and size of grille, register, linear/square diffuser and louver shall also be provided for the purpose of air balancing.

All air inlets/outlets shall be manufactured as per Tuttle & Bailey standards of air inlets/outlets.

7-02 GRILLES

All side wall outlets and inlets shall be of sizes and characteristics as scheduled and shown on the Drawings.

Double deflection type grilles shall have vertical front bars and horizontal back bars.

All supply outlets shall have opposed blade dampers, finished in black paint, fixed to the outlet and shall be operatable with a removable key inserted from front of the grille.

All return and/or exhaust inlets shall have similar dampers if scheduled.

7-03 CEILING DIFFUSERS

Ceiling diffusers shall be of the sizes and characteristics as scheduled and shown on the Drawings.

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Ceiling diffusers shall be furnished with volume dampers as furnished by the diffuser manufacturer, finished in powder coated with plant as approved by the Engineer.

Volume control for these diffusers shall be accessible through the diffuser from below the ceiling and shall maintain their setting when adjusted. Each diffuser shall be provided with sponge rubber or felt gasket. Return diffusers shall be similar to supply diffusers unless otherwise indicated. Inner core shall be removable and shall be mounted on outer frame. (Throw pattern for supply diffusers shall be as shown on Drawings by arrows or as shown in schedule).

Ceiling diffusers intended for use with flexible round insulated duct shall have suitable inlet box.

7-05 EA/OA LOUVERS

All louvers shall be of approved construction as per AMCA standard 500-74. All louvers shall be fitted with aluminum mesh bird and anti vermin screens. The design of the OA inlet louver blades shall be suitable to arrest rainwater, sand and dust from incoming outdoor air. Sizes are to be as given on the Drawings. Louvers shall be complete in all respects with mounting accessories. Louvers shall be of Scheduled material and finish. Design of OA and EA louvers shall be similar. All EA louvers shall have back draft dampers upstream of louvers.

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SECTION 8- INSPECTION TESTING AND COMMISSIONING

8-01 GENERAL

8-01.1 The whole of the works supplied under this Contract shall be subject to inspection and tests by the Employer and/or Engineer should he so require, during manufacturing erection and after completion. The inspection and tests shall include, but not be limited to, the requirements of this Section of the Specifications.

8-01.2 For this purpose the Engineer shall, at all reasonable times, be allowed free and ready access to the Contractor's shop and the shops of his suppliers for the purpose of inspecting the specified equipment components, or any other parts, and obtaining information as to the progress of the work. Failure on the part of the Engineer at this or any other time, to discover or reject materials or work which do not meet specified requirements shall not be deemed an acceptance thereof nor a waiver of defects therein.

8-01.3 Specific tests required by the various items of the Plant, Parts, materials and equipment shall be treated in accordance with the specifications of the corresponding clauses of the Specifications.

8-01.4 The Contractor shall submit to the Engineer, one month prior to the date of commencement of the balancing and performance tests, six (6) copies of the complete test procedure. The procedure, method and points of measurement as well as the method of calculation shall be approved by the Engineer before any test is carried. Six (6) copies of the test results shall be furnished to the Engineer for his approval.

8-01.5 The Contractor shall supply all necessary testing and balancing instruments, which shall include the instruments to carryout any test of any kind on a piece of equipment, apparatus part of system or on a complete system if the Engineer requests such a test for determining specified or guaranteed data, as given in the Specifications or in the Schedule of Equipment. Necessary skilled staff shall be provided by Contractor.

8-01.6 Any damage resulting from the test shall be repaired and/or damaged material replaced with intimation to the Engineer, all to the satisfaction of the Engineer, and at no extra cost to the Employer. Skilled staff shall again be provided by the Contractor.

8-01.7 In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommenced after the adjustment or repairs have been completed.

8-01.8 All testing, balancing and final adjustment shall be in accordance with the provision of the applicable ASHRAE Standards, or other approved relevant standards.

8-01.9 The Contractor shall test a piece of equipment, apparatus, parts of system or a complete system in accordance with method and Schedule of Tests provided by the Engineer to determine Specified or Guaranteed data, given in the Specifications, Schedule of Equipment and Contractor's Data Sheets.

8-01.10 The contractor shall be responsible for carrying out tests on the material/equipment/installation furnished by him.

8-02 PRELIMINARY INSPECTION & TESTS

8-02.1 General

All equipment shall be inspected and tested to determine the completeness and general conformance to specified requirements, when operated independent of overall HVAC System, for noise, vibration, and electrical data.

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8-02.2 Piping System

Pressure tests on part or whole of piping network shall be applied only before connection of equipment and appliances.

In no case shall piping, equipment or appliances be subjected to the pressure exceeding their rating.

Tests shall be completed and approved before any insulation is applied on pipes before these are concealed. Tests shall be performed in the presence of and to the satisfaction of the Engineer or his representative. Any leaks or defects discovered by the tests shall be repaired and the system retested as above, all at no additional cost to the Employer.

8-02.3 Ductwork

Inspection on ductwork shall be carried out by Contractor's supervisor in the presence of Engineer's representative to the satisfaction of the Engineer.

All joints in ducts and at outlets shall be physically inspected for air leakage. All dampers shall be tested for proper operation.

Ducts, plenums and casing shall be inspected and made substantially air tight before covering with insulation or concealing in the masonry. The terms substantially airtight shall be construed to mean that no air leakage will be noticeable through the senses of feeling or hearing.

8-02.4 Equipment

All HVAC equipment shall be inspected for visible damage, operation of moving parts, noise and vibration. Tests shall be carried out with readings of RPM, ampere, voltage, etc. to verify the name plate data.

8-02.5 Electrical Equipment

All electrical panels shall be cleaned and adjusted on site before application of power. The following tests shall be carried out:

1) Wire and cable continuity tests.

2) Insulation resistance tests, phase to phase and phase to earth, on all circuits and equipment, using 500 volts megger. The megger reading shall not be less than one meg ohm.

3) Earth resistance between metallic conduit systems and earth must not exceed half (1/2) ohm.

4) Phasing out and phase rotation tests.

5) Operating tests on all protective relays to prove their correct operation before energizing the main equipment.

6) Operating tests on all starters, circuit breakers, etc.

8-03 BALANCING AND COMMISSIONING

8-03.1 Air Balancing

All air handling and ventilating equipment, ductwork air inlet and outlets and air

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volume control dampers shall be adjusted and balanced to deliver within 10% of the specified quantities indicated on the Drawings. Where the equipment or systems depend upon controls for proper operation, functioning and performance, the Engineer may ask the Contractor that the later shall be operated simultaneously with the equipment or system during tests.

If the air quantities cannot be delivered without exceeding the speed range of the sheaves or the available horsepower, the Engineer shall be notified before proceeding with the balancing of air distribution system. Any addition/replacements required to meet the specified flow rates shall be the responsibility of the Contractor at his own cost.

8-03.1 Commissioning

Upon completion of whole or part of HVAC System is substantially complete and ready for operation as specified, the Contractor shall carry out Commissioning. Appropriate Seasons are not necessary and the purpose of the commissioning is to start-up the whole or part of HVAC System with manual and/or automatic controls and to put the whole or part of HVAC system in operation to make it ready to provide cooling and/or heating.

8-04 PERFORMANCE TESTS

Each equipment of HVAC plant shall be tested for performance after successful completion of Commissioning of that equipment to determine the Specified and Guaranteed Data at Specified Operating Conditions as shown in Equipment Schedule and Specifications. These tests shall be carried out in appropriate seasons.

The test data shall not deviate by more than five percent (5%) from the guaranteed capacity data.

Should any part of the apparatus or system fail to meet the specification requirements, it shall be adjusted, repaired or replaced to the satisfaction of the Engineer by the Contractor at his own cost. The complete Performance Test shall than be repeated.

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SECTION 9 - MEASUREMENTS AND PAYMENTS

9-01 GENERAL

Unless expressly excluded, the cost of all materials, equipment and works required by Special Provisions and Technical Provisions of Specifications, acceptably furnished, installed and tested as Specified, shall be considered to be included in the amounts tendered against the item listed in the Schedule of Prices AB-H.

9-02 SOP ITEM NO. 1 (i to xxii), 2 (i to vi), 3, 6, 16(i to viii) & 19

9-02.1 Measurement

Measurement will be made of each item and all associated accessories and work acceptably furnished, installed and tested as individual units.

9-02.2 Payment

Payment of these items will be made at the Contract Unit Rates for these items entered in Schedule of Prices.

9-03 SOP ITEM NO. 1 (xxii & xix), 2 (vii & viii), 4, 5, 8, 16 (x), 17 & 18

9-03.1 Measurement

No measurement will be made of the items mentioned above.

9-03.2 Payment

Payment will be made at a Contract Lump sum Price entered for the respective item in Schedule of Prices.

9-04 SOP ITEM NO. 7

9-04.1 Measurement

Measurement will be made for surface area of installed sheet metal ducting and plenums and grease exhaust duct for different gauges. No measurement will be made for wastage, bracing flanges, hangers and supports, fasteners, anchor bolts air-turning vanes, splitter dampers, and grease exhaust duct protection.

9-04.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

9-06 SOP ITEM NO. 11, 12, 13, 14 & 15

9-06.1 Measurement

Measurement will be made of the core area of the respective item acceptably furnished, installed and tested. No measurement will be made of accessories and attachments.

9-06.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

9-07 SOP ITEM NO. 10

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9-07.1 **Measurement**

Measurement will be made of the length of pipe/flex. Round duct/ flex. Duct connection route at centre line of pipe/ duct, for the piping/ ducting, fittings and accessories, acceptably furnished, installed and tested. No measurement will be made for fittings, accessories, attachments, hangers, nuts and bolts.

9-07.2 **Payment**

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

9-08 **SOP ITEM NO. 9**

9-08.1 **Measurement**

Measurement will be made of the area of sheet metal to which the acoustic Liner or insulation is applied. No measurement will be made for accessories and adhesive.

9-08.2 **Payment**

Payment or deduction will be made for the number of units measured as above at the Contract Unit Rates entered in SOP.

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EQUIPMENT SCHEDULES

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ACADEMIC BLOCK

AIR HANDLING UNITS

(EUROVENT CERTIFIED MATERIAL AND PERFORMANCE)

EQUIPMENT SCHEDULE

SHEET 1 OF 1

CODE	TYPE	SECTION CONFIGURATION	SUPPLY FAN			OUTDOOR AIR (OA)	OUTDOOR AIR (OA) THRU HRV	RETURN AIR (RA)	DISCH AIR	REFER TO SCHEDULE OF DX	REF TO SCH OF MXB	HUMIDIFIER			AREA SERVED
			AIR FLOW (CFM)	EXT SP (IN)	MAX OV (FPM)	(CFM)	(CFM)	(CFM)		CCHC NO.	MXB NO.	CODE	TYPE	EVAP RATE (LBS/HR)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
AHU-1	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	4715	2	2000	1388		3327	TD	1	1	HUM-1	S	32.4	GF Pharmacology Lab
AHU-2	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	12461	2	2000	3000		9461	TD	2	2	HUM-2	S	69.9	1F Molecular Biology & Genetics Lab
AHU-3	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	8992	2	2000	2700		3692	TD	3	3	HUM-3	S	62.9	1F Pathology & Bio Chemistry Labs
AHU-4	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	10618	2	2000	4132		6586	TD	4	4	HUM-4	S	86.8	2F Anatomy Lab
AHU-5	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-FAN	11239	2.0	2000	-	11239	-	TD	5	5	-	-	-	3F Microbiology Lab

LEGEND

CFM = CUBIC FEET/MINUTE
HDT = HORIZANTOL DRAW THRU
TH = TOP HORIZANTOL
UB = UP BLAST
VDT = VERTICAL DRAW THRU
UVL = ULTRA VIOLET LAMP

DXC = DIRECT EXPANSION COIL
HUM = HUMIDIFIER
MXB = MIXING BOX
F.F = FLAT FILTER BOX WITH HIGH VELOCITY FILTER
B.F = BAG FILTER BOX WITH HIGH VELOCITY FILTER
FPM = FEET PER MINUTE
S= STEAM HUMIDIFIER

NOTES

1. FAN SHOULD BE SELECTED FOR TOTAL SP= ESP+AHU SP + FILTER PRESSURE LOSS (AVG. OF MFR RECOMMENDED DIRTY & CLEAN FILTER)
2. MOTOR HP SHALL BE ATLEAST 125 % OF REQUIRED BHP
3. FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE "LIST OF APPROVED/RECOMMENDED MANUFACTURERS" MANUFACTURERS FOR ITEMS/MATERIALS/EQUIPMENT OF HVAC WORKS"
4. AHUs INSTALLED OUTSIDE SHALL BE WEATHER PROOF TYPE WITH WEATHER RESISTANT CANOPY SUITABLE FOR EXPOSED TO VISION INSTALLATION
5. ALL MOTORS SHALL BE DESIGNED FOR CONTINUOUS OPERATION IN THE TEMPERATURE OF 104 °F (40 °C)

PUBLIC PROCUREMENT REGULATORY AUTHORITY
EPADS
NESPAK ISLAMABAD
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LTD

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ACADEMIC BLOCK

AIR HANDLING UNITS

(EUROVENT CERTIFIED MATERIAL AND PERFORMANCE)

EQUIPMENT SCHEDULE

SHEET 1 OF 11

CODE	TYPE	SECTION CONFIGURATION	SUPPLY FAN			OUTDOOR AIR (OA)	OUTDOOR AIR (OA) THRU HRV	RETURN AIR (RA)	DISCH ARR.	REFER TO SCHEDULE OF DX	REF TO SCH OF MBR	HUMIDIFIER			AREA SERVED
			AIR FLOW (CFM)	EXT SP (IN)	MAX OV (FPM)	(CFM)	(CFM)	(CFM)		DCHC NO.	MBR NO.	CODE	TYPE	EVAP RATE (LBS/HR)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
AHU-1	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	4715	1.2	2000	1388		3327	TD	1	1	HUM-1	S	32.4	GF Pharmacology Lab
AHU-2	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	12461	1.7	2000	3000		9461	TD	2	2	HUM-2	S	85.5	1F Molecular Biology & Genetics Lab
AHU-3	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	8352	1.9	2000	2700		3652	TD	3	3	HUM-3	S	52.9	1F Pathology & Bio Chemistry Labs
AHU-4	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-HUM-FAN	10618	1.5	2000	4122		6516	TD	4	4	HUM-4	S	95.5	2F Anatomy Lab
AHU-5	MEDICAL GRADE TYPE HORIZONTAL DRAW THRU DOUBLE SKIN	MXB-FF-BF-DXC-FAN	11239	2.0	2000	-	11239	-	TD	5	5	-	-	-	3F Microbiology Lab

LEGEND

CFM = CUBIC FEET/MINUTE
HDT = HORIZANTOL DRAW THRU
TH = TOP HORIZANTOL
UH = UP BURST
VDT = VERTICAL DRAW THRU
UVL = ULTRA VIOLET LAMP

DXC = DIRECT EXPANSION COIL
HUM = HUMIDIFIER
MXB = MIXING BOX
F.F = FLAT FILTER BOX WITH HIGH VELOCITY FILTER
B.F = BAG FILTER BOX WITH HIGH VELOCITY FILTER
FPM = FEET PER MINUTE
S= STEAM HUMIDIFIER

NOTES:

1. FAN SHOULD BE SELECTED FOR TOTAL SP= ESP+AHU SP
   + FILTER PRESSURE LOSS (AVG. OF MFR RECOMMENDED DIRTY & CLEAN FILTER)
2. MOTOR HP SHALL BE ATLEAST 120 % OF REQUIRED BHP
3. FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE "LIST OF APPROVED/RECOMMENDED MANUFACTURERS" MANUFACTURERS FOR ITEMS/MATERIALS/EQUIPMENT OF HVAC WORKS"
4. AHUs INSTALLED OUTSIDE SHALL BE WEATHER PROOF TYPE WITH WEATHER RESISTANT CANOPY SUITABLE FOR EXPOSED TO VISION INSTALLATION
5. ALL MOTORS SHALL BE DESIGNED FOR CONTINUOUS OPERATION IN THE TEMPERATURE OF 104 °F (40 °C)

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

ACADEMIC BLOCK

AIR HANDLING UNITS (DX- COILS)

(EUROVENT CERTIFIED-MATERIAL AND PERFORMANCE)

CODE	INSTALLED IN	MAX. COIL FV FPM	COOLING				HEATING		
			TH (MBH)	EDB deg F	EWB deg F	SH (MBH)	TH (MBH)	EDB deg F	EWB deg F
1	2	3	4	5	7	8	9	10	15
DXC-1	AHU-1	475	145.6	82.8	66.6	123.0	65.9	59.0	72.8
DXC-2	AHU-2	475	348.0	80.3	65.1	296.2	108.7	60.7	69.3
DXC-3	AHU-3	475	240.0	87.8	67.8	200.0	98.0	55.3	70.5
DXC-4	AHU-4	475	369.2	86.5	67.3	313.1	155.0	56.3	70.7
DXC-5	AHU-5	475	391.0	71.4	61.9	351.0	117.9	37.7	70.7

LEGEND:

CFM	CUBIC FEET PER MINUTE	EAT	ENTERING AIR TEMPERATURE
FPM	FEET PER MINUTE	EDB	ENTERING DRY BULB TEMPERATURE
SH	COIL SENSIBLE HEAT	EWB	ENTERING WET BULB TEMPERATURE
TH	COIL TOTAL HEAT	EWT	ENTERING WATER TEMPERATURE
USGPM	UNITED STATES GALLON PER MINUTE	LAT	LEAVING AIR TEMPERATURE
DXC	DIRECT EXPANSION COIL	LWT	LEAVING WATER TEMPERATURE

NOTES:

1. THE COIL ROWS SHALL BE MAXIMUM 8 NOS
2. THE FINS PER INCH SHALL NOT BE MORE THAN 10

PUBLIC PROCUREMENT REGULATORY AUTHORITY
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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

ACADEMIC BLOCK

AIR HANDLING UNITS (DX- COILS)

(EUROVENT CERTIFIED-MATERIAL AND PERFORMANCE)

CODE	INSTALLED IN	MAX. COIL FV FPM	COOLING				HEATING		
			TH (MBH)	EDB deg F	EWB deg F	SH (MBH)	TH (MBH)	EDB deg F	EWB deg F
1	2	3	4	5	7	8	9	10	15
DXC-1	AHU-1	475	145.6	82.8	66.6	123.0	65.9	59.0	72.8
DXC-2	AHU-2	475	348.0	80.3	65.1	296.2	108.7	60.7	69.3
DXC-3	AHU-3	475	240.0	87.8	67.8	200.0	98.0	55.3	70.5
DXC-4	AHU-4	475	369.2	86.5	67.3	313.1	155.0	56.3	70.7
DXC-5	AHU-5	475	391.0	71.4	61.9	351.0	117.9	37.7	70.7

LEGEND:

CFM	CUBIC FEET PER MINUTE	EAT	ENTERING AIR TEMPERATURE
FPM	FEET PER MINUTE	EDB	ENTERING DRY BULB TEMPERATURE
SH	COIL SENSIBLE HEAT	EWB	ENTERING WET BULB TEMPERATURE
TH	COIL TOTAL HEAT	EWT	ENTERING WATER TEMPERATURE
USGPM	UNITED STATES GALLON PER MINUTE	LAT	LEAVING AIR TEMPERATURE
DXC	DIRECT EXPANSION COIL	LWT	LEAVING WATER TEMPERATURE

NOTES:

1. THE COIL ROWS SHALL BE MAXIMUM 8 NOS
2. THE FINS PER INCH SHALL NOT BE MORE THAN 10

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD
ACADEMIC BLOCK
CONDENSING UNITS FOR AIR HANDLING UNITS

CODE	TYPE	LINKED WITH COIL	NET COOLING CAPACITY (MBH)	NET HEATING CAPACITY (MBH)	DESIGN COND. ENTERING AIR TEMPT (DEG. F) WINTER	DESIGN COND ENTERING AIR TEMPT (DEG. F) SUMMER	POWER SUPPLY	ACCESSORIES	REMARKS
1	2	3	4	5	7	8	9	10	11
ACU-1	AIR COOLED CONDENSING REVERSIBLE UNIT	DXC-1	145.6	65.9	37.8	111	400V/3PH/50Hz	AS SPECIFIED	FOR DX-COIL DATA SEE SCHEDULE OF DX-COILS FOR AHUs
ACU-2	AIR COOLED CONDENSING REVERSIBLE UNIT	DXC-2	348.0	108.7	37.8	111	400V/3PH/50Hz	AS SPECIFIED	FOR DX-COIL DATA SEE SCHEDULE OF DX-COILS FOR AHUs
ACU-3	AIR COOLED CONDENSING REVERSIBLE UNIT	DXC-3	240.8	86	37.8	111	400V/3PH/50Hz	AS SPECIFIED	FOR DX-COIL DATA SEE SCHEDULE OF DX-COILS FOR AHUs
ACU-4	AIR COOLED CONDENSING REVERSIBLE UNIT	DXC-4	366.2	102	37.8	111	400V/3PH/50Hz	AS SPECIFIED	FOR DX-COIL DATA SEE SCHEDULE OF DX-COILS FOR AHUs
ACU-5	AIR COOLED CONDENSING REVERSIBLE UNIT	DXC-5	391.0	117.9	37.8	111	400V/3PH/50Hz	AS SPECIFIED	FOR DX-COIL DATA SEE SCHEDULE OF DX-COILS FOR AHUs

LEGEND
DXC: DIRECT EXPANSION COIL

NOTES:
1. WHEN EQUIPMENT OF EXACT CAPACITY IS NOT AVAILABLE THEN NEXT LARGER UNIT SHALL BE PROVIDED.
2. THE CAPACITY OF THE CONDENSING UNITS SHOULD MATCH WITH THE CAPACITY OF THE SELECTED MODEL OF RESPECTIVE DX COILS.
3. FOR "MAKE" AND "COUNTRY OF MANUFACTURER" SEE "LIST OF APPROVED/RECOMMENDED MANUFACTURERS" FOR ITEMS / MATERIALS / EQUIPMENTS OF HVAC WORKS".
4. THE CONDENSING UNIT SHALL BE CAPABLE OF OPERATING IN AMBIENT TEMPERATURE OF 115 °F (46 °C).
5. THE CONDENSING UNIT SHALL BE ARI OR EUROVENT CERTIFIED.
6. IN CASE REVERSIBLE UNIT IS NOT AVAILABLE ELECTRIC DUCT HEATER SHALL BE PROVIDED.

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. NESPAK ISLAMABAD

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CODE	TYPE	SECTIONAL CONFIGURATION	SUPPLY FAN			RETURN FAN			DISCHARGE ARRANGEMENT	CROSS FLOW PLATE TYPE ENERGY RECOVERY CORE (ERC)											REMARKS
			AIR FLOW RATE (CFM)	DESIGN EXTERNAL STATIC PRESSURE (IN. WG)	MAXIMUM OUTLET VELOCITY (FPM)	AIR FLOW RATE (CFM)	MAXIMUM EXTERNAL STATIC PRESSURE (IN. WG)	MAXIMUM OUTLET VELOCITY (FPM)		SUMMER						WINTER					
										RETURN AIR			OUTDOOR AIR				RETRUN AIR			OUTDOOR AIR					
										AIR FLOW (CFM)	EDB (°F)	EWB (°F)	AIR FLOW (CFM)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	AIR FLOW (CFM)	EDB (°F)	EWB (°F)	AIR FLOW (CFM)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
HRV-01	SIDE-BY-SIDE SAHL SINGLE ZONE HEAT RECOVERY VENTILATOR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LEGENDS

CFM = CUBIC FEET PER MINUTE
HOT = HORIZONTAL DRAW THROUGH
TH = TOP HORIZONTAL
OB = OPPOSITE
VDT = VERTICAL DRAW THROUGH
OV = OUTLET VELOCITY
WHD = WHEEL BOX
FF = FLAT FILTER
FWH = FELT HEW MINUTE
BF = BAG FILTER

FHE = PLATE TYPE HEAT EXCHANGER
RF = RETURN FAN
SF = SUPPLY FAN
RA = RETURN AIR
SA = SUPPLY AIR
EA = EXHAUST AIR
OA = OUTDOOR AIR
EDB = ENTERING DRY BULB TEMPERATURE
LWB = LEAVING WET BULB TEMPERATURE
LDB = LEAVING DRY BULB TEMPERATURE

NOTES:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

NESPAK ENGINEERING SERVICES PAKISTAN (PVT) LTD. ISLAMABAD

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD
ACADEMIC BLOCK
VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)
(SHARED EQUIPMENT CERTIFIED)

SR. NO.	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY (TR) / UNIT (MBH)	QTY.	POWER SUPPLY V / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY (TR) / UNIT (MBH)	QTY.	POWER SUPPLY V / PH / HZ (OUTDOOR UNITS)	REFRIGERANT	EER RATING (MBH/KW) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	9	8	10	11	12	13
GROUND FLOOR												
1	GF - Examination Hall	CU-1-1, CU-1-2	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.0	2.00	220/1/50	CU-1-1	336.00	1	460/3/50	SEE NOTE 3	10
	GF - Room 1	CU-1-1	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 2	CU-1-2	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 3	CU-1-3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 4	CU-1-4	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 5	CU-1-5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 6	CU-1-6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 7	CU-1-7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 8	CU-1-8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 9	CU-1-9	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 10	CU-1-10	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 11	CU-1-11	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Room 12	CU-1-12	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.0	1.00	220/1/50						
	GF - Committee Room	CU-1-17, CU-1-18	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.0	2.00	220/1/50						
	GF - Fresh Air - Left	TFU-1-1	TROUGH FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	60.0	1.00	220/1/50						
2	GF - Class Room 1	CU-1-4, CU-1-5, CU-1-6, CU-1-7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	4	220/1/50	CU-1-1	660.00	1	460/3/50	SEE NOTE 3	10
	GF - Lecture Theatre	CU-1-8, CU-1-13, CU-1-14, CU-1-15, CU-1-16, CU-1-17	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	6	220/1/50						
	GF - Class Room 2	CU-1-9, CU-1-10, CU-1-11, CU-1-12	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	4	220/1/50						
3	GF - R & I	CU-3-2	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50	CU-3	216.00	1	460/3/50	SEE NOTE 3	10
	GF - Library	CU-1-18, CU-1-19, CU-1-20, CU-1-21	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	4	220/1/50						
	GF - Computer Lab	CU-3-1, CU-3-2	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	220/1/50						
4	GF - Fresh Air - Right	TFU-3-2, TFU-3-3, TFU-3-4	TROUGHED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	60.00	3	220/1/50	CU-3-1	300.00	1	460/3/50	SEE NOTE 3	10

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ACADEMIC BLOCK

VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)

(AS PER BOQ/PC/VOL-II/PROCUREMENT CERTIFIED)

SR. NO.	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY/ UNIT (MBH)	QTY.	POWER SUPPLY Φ / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY/ UNIT (MBH)	QTY.	POWER SUPPLY Φ / PH / HZ (OUTDOOR UNITS)	REFERENCE MAKE	EER RATING (MINIMUM) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	8	9	10	11	12	13
FIRST FLOOR												
1	1F Physiology Lab	CU-1.21 CU-1.22	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	2	220/1/50	CU-1.1	108	1	460/3/50	SEE NOTE 3	13
	1F Room	CU-1.1	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	1F Research Room	CU-1.2	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	1F Computer Lab	CU-1.3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	1F Fresh Air Unit	TFU-1.1	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	1	220/1/50						
2	1F Class Room 1	CU-1.23 CU-1.24 CU-1.25 CU-1.26	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	4	220/1/50	CU-1.2	192.00	1	460/3/50	SEE NOTE 3	13
	1F Class Room 2	CU-1.27 CU-1.28 CU-1.29 CU-1.30	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	4	220/1/50						
	1F Class Room 3	CU-1.31 CU-1.32 CU-1.33 CU-1.34 CU-1.35 CU-1.36	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	6	220/1/50						
	Director	CU-1.5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
1	1F Fresh Air Right	TFU-1.2 TFU-1.3 TFU-1.4	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	3	220/1/50	CU-1.3	228.00	1	460/3/50	SEE NOTE 3	13
SECOND FLOOR												
8	2F Operating Room	CU-2.3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50	CU-4.1	240.00	1	460/3/50	SEE NOTE 3	13
	2F PEADD Room	CU-2.11	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F Medical Ward	CU-2.5 CU-2.6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	2	220/1/50						
	2F Comm Room 2	CU-2.10	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F Hi Family Area	CU-2.09	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F Clean Supply	CU-1.22	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	2F Medical Supply	CU-1.23	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	2F N.S	CU-2.11	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	2F Preparation Room	CU-2.8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	2F Dissection Freezer Room	CU-1.6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F Simulation Technology Room	CU-1.7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F Fresh Air Left	TFU-2.1	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	72.00	1	220/1/50						

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD
ACADEMIC BLOCK
VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)
(PROCUREMENT CERTIFIED)

SR NO	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY) UNIT (MBH)	QTY	POWER SUPPLY V / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY) UNIT (MBH)	QTY	POWER SUPPLY V / PH / HZ (OUTDOOR UNITS)	REFRENCE MAKE	ESR RATING (MINIMUM) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	8	9	10	11	12	13
9	2F - Director	CU-2-9	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50	CU-2-1	192.00	1	460/3/50	SEE NOTE-3	16
	2F - Asst. Director-1	CU-2-8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F - Technician	CU-2-10	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	2F - Law Facility Area	CU-2-11	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	2F - Skills Lab	CU-2-15	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F - Reception	CU-2-3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F - Lockers	CU-2-14	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	2F - Asst. Director-2	CU-2-11	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	2F - Fresh Air - Right	FU-1-2	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	60.00	1	220/1/50						
19	2F - Class Room-1	CU-4-37 CU-4-38 CU-4-39 CU-4-40 CU-4-45 CU-4-46	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	6	220/1/50	CU-5-1	360.00	1	460/3/50	SEE NOTE-3	16
	2F - Class Room-2	CU-4-41 CU-4-42 CU-4-43 CU-4-44 CU-4-47 CU-4-48	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	6	220/1/50						
	2F - Emergency Ward	CU-2-12 CU-2-13	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	220/1/50						
11	2F - Fresh Air - Right	FU-2-6 FU-2-9	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	2	220/1/50	CU-2-3	192.00	1	460/3/50	SEE NOTE-3	16
THIRD FLOOR												
12	3F - Seminars	CU-3-14 CU-3-15	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	220/1/50	CU-4-2	240.00	1	460/3/50	SEE NOTE-3	16
	3F - Girls Common Room	CU-3-16	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	3F - Executive Dining	CU-4-47 CU-4-48 CU-4-49 CU-4-50	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	4	220/1/50						
	3F - Staff Dining	CU-2-15 CU-2-16 CU-2-17 CU-2-18 CU-2-19 CU-2-20	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	6	220/1/50						
13	3F - Fresh Air - Right	TFU-3-12 TFU-3-13	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	2	220/1/50	CU-2-3	192.00	1	460/3/50	SEE NOTE-3	16

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ACADEMIC BLOCK

VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)

(HYBRID, R32/R410A CERTIFIED)

SR NO.	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY/ UNIT (MBH)	QTY.	POWER SUPPLY Φ / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY/ UNIT (MBH)	QTY.	POWER SUPPLY Φ / PH / HZ (OUTDOOR UNITS)	REFRENCE MAKE	EER RATING (MINIMUM) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	8	9	10	11	12	13
13	3F - Research Cubicle 1	CIU-3-21	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50	CU-F-2	336.00	1	400/3/50	SEE NOTE 3	16
	3F - Research Cubicle 2	CIU-3-22	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	3F - Research Cubicle 3	CIU-3-23	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	3F - Research Cubicle 4	CIU-3-24	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	3F - Research Cubicle 5	CIU-4-31	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1	220/1/50						
	3F - Reception	CIU-3-19-CIU-3-20	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	220/1/50						
	3F - Prayer Hall (M)	CIU-3-31-CIU-3-32 CIU-3-33-CIU-3-34	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	4	220/1/50						
	3F - Prayer Hall (F)	CIU-3-35	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	3F - Doctor (F)	CIU-1-13	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	3F - Doctor (M)	CIU-1-14	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	3F - N/S	CIU-2-25	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	3F - Clinical Trial Unit	CIU-3-26-CIU-3-27	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	220/1/50						
	3F - Fresh Air - Right	TFU-2-3	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	72.00	1	380/3/50						
FOURTH FLOOR												
14	4F - Auditor	CIU-4-51	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1	220/1/50	CU-F-4	672.00	1	460/3/50	SEE NOTE 3	16
	4F - P.A	CIU-2-28	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	4F - Staff	CIU-4-53-CIU-4-54	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	2	220/1/50						
	4F - Server Room & Phone Exchange	CIU-3-29	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	4F-Work Station	CIU-3-57-CIU-3-66 CIU-3-1	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	4F-P.A-2	CIU-1-15	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	4F - Director 1	CIU-4-51	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1	220/1/50						
	4F - Staff	CIU-3-28-CIU-3-30 CIU-3-31	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	3	220/1/50						
	4F - Fresh Air - Right	TFU-1-3	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	1	220/1/50						

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SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD
ACADEMIC BLOCK
VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)
(AMMENDMENT CERTIFIED)

SR. NO.	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY / UNIT (MBH)	QTY	POWER SUPPLY V / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY / UNIT (MBH)	QTY.	POWER SUPPLY V / PH / HZ (OUTDOOR UNITS)	REFERENCE MAKE	EER RATING (MINIMUM) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	8	9	10	11	12	13
[illegible]	AP - PRO to HC	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]	CU-4-3	240.00	1	400/3/50	SEE NOTE 1	16
	AP - HC Office	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Relining Rm	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Scrubs room	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Sterilization Rm	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Fresh Air - VC Secretariate	[illegible]	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
[illegible]	AP - Cafe	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]	CU-4-4	240.00	1	400/3/50	SEE NOTE 3	16
	AP - Director	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - P.A	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - P.A	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Office	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Deputy Director (DPC)	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Director (DPC)	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Fresh Air - DPC & IT	[illegible]	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
[illegible]	AP - P.A to H	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]	CU-3-4	192.00	1	400/3/50	SEE NOTE 3	16
	AP - Reception H	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Staff # H	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Executive Office H	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Director (H)	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Data Registrar (H)	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Data Registrar (H)	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Registrar (H)	[illegible]	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						
	AP - Fresh Air - Registrar Office	[illegible]	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	[illegible]	[illegible]	[illegible]						

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ACADEMIC BLOCK

VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)

(PANELBOARD CERTIFIED)

SR. NO.	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY / UNIT (MBH)	QTY.	POWER SUPPLY V / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY / UNIT (MBH)	QTY.	POWER SUPPLY V / PH / HZ (OUTDOOR UNITS)	REFRENCE MARK	EER RATING (MINIMUM) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	8	9	10	11	12	13
FIFTH FLOOR												
10	5F - Staff 1 H	CU-1.45 CU-1.46 CU-1.47 CU-1.48 CU-1.49	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	15.00	4	220/1/50	CU-1.2	198.00	1	460/3/60	SEE NOTE 2	10
	5F - PIA 1 H	CU-1.19	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	5F - Director R&D H	CU-1.51	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	5F - Deputy Controller 1H	CU-2.33	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F - Deputy Controller 2H	CU-2.28	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F - Deputy Controller 3H	CU-2.29	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	7.00	1	220/1/50						
11	5F - Work Station 2 H	CU-1.52 CU-1.53 CU-1.54 CU-1.55 CU-1.56	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	15.00	5	220/1/50	CU-1.5	300.00	3	460/3/60	SEE NOTE 2	10
	5F - AEO Controller H	CU-1.15	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1	220/1/50						
	5F - Controller Exam H	CU-1.5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	30.00	1	220/1/50						
	5F PIA 2 H	CU-2.36	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F Paper Setting Room H	CU-2.32	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F Wiring Rm H	CU-2.8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F Printing Rm H	CU-2.7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	15.00	1	220/1/50						
	5F - Office	CU-2.6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F - Waiting Room	CU-2.66	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	5F - Assessment Room	CU-2.18	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	5F - Assessment Room	CU-1.20	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	5F - Assessment Room	CU-1.21	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	9.00	1	220/1/50						
	5F - Fresh Air - Lab	TFU-2.3	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	72.00	1	220/1/50						
20	5F - Work Station 1 H	CU-1.57 CU-1.58 CU-1.59	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	15.00	3	220/1/50	CU-1.9	240.00	1	460/3/60	SEE NOTE 2	10
	5F - Staff 2 H	CU-1.60 CU-1.61	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	220/1/50						
	5F - PS 3 H	CU-2.10	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	220/1/50						
	5F - Treasurer H	CU-1.62	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	5F - ADD Treasurer H	CU-1.63	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	5F - Deputy Treasurer H	CU-1.64	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	5F - Committee H	CU-1.65	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220/1/50						
	5F - Fresh Air - Right	TFU-2.4	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	72.00	1	220/1/50						

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ACADEMIC BLOCK

VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS (REVERSIBLE COOLING / HEATING TYPE)

(AHRI/EUROVENT CERTIFIED)

SR. NO.	INSTALLED IN	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY UNIT (MBH)	QTY	POWER SUPPLY V / PH / HZ (INDOOR UNITS)	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY UNIT (MBH)	QTY	POWER SUPPLY V / PH / HZ (OUTDOOR UNITS)	REFERENCE MAKE	SEER RATING (MINIMUM) AS PER ASHRAE 90.1 OR EQUIVALENT
1	2	3	4	5	6	7	8	9	10	11	12	13
IT ROOMS												
01	OP-IT Room-01	AMU-1.4	DECORATIVE WALL MOUNTED HEAT PUMP TYPE	18.00	1	220-1-50	01-A	60.00	1	460-3-50	SEE NOTE 3	16
	IT-IT Room-01	WU-1.5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220-1-50						
	IP-IT Room-01	WU-1.6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220-1-50						
	IP-IT Room-01	WU-1.7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220-1-50						
	IP-IT Room-01	WU-1.8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1	220-1-50						

NOTE

1. ALL VRF UNITS SHALL BE COMPATIBLE TO OPERATE AT 415 V (±6%), 3 PH, 50 HZ.
2. ALL VRF UNITS SHALL BE OF R-410A REFRIGERANT TYPE OR BETTER ENVIRONMENT FRIENDLY REFRIGERANT.
3. THE NOMINAL CAPACITIES ARE RATED AT 95°F DB / 64°F WB (35°C DB / 18°C WB).
4. FOR 'MAKE' AND 'COUNTRY OF MANUFACTURE' SEE 'LIST OF APPROVED/RECOMMENDED MANUFACTURERS'.
5. OFFERED UNITS SHALL BE AHRI/EUROVENT CERTIFIED.
6. FOR TFU SCHEDULE REFER SHEET 13 of 17.

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ACADEMIC BLOCK

SCHEDULE OF TREATED FRESH CEILING CONCEALED DUCTED HEAT PUMP UNIT (REVERSIBLE COOLING / HEATING TYPE)

EQUIPMENT SCHEDULE

SR. NO.	CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY (MBH)	SUPPLY AIR (CFM)	EXTERNAL STATIC PRESSURE (PA)	POWER SUPPLY V / PH / HZ	REFERENCE MAKE
1	2	3	4	5	6	7	8
1	TFU-1	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	600	0.75	220/1/50	SEE NOTE-2
2	TFU-2	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	72.00	900	0.75	220/1/50	SEE NOTE-2
2	TFU-3	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	1200	0.75	220/1/50	SEE NOTE-2

NOTES:

1. ALL VRF UNITS SHALL BE OF R-410A REFRIGERANT TYPE OR BETTER ENVIRONMENT FRIENDLY REFRIGERANT.
2. FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE "LIST OF APPROVED/RECOMMENDED MANUFACTURERS"

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

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ACADEMIC BLOCK

FANS

EQUIPMENT SCHEDULE

SR NO.	CODE	TYPE	SERVICE	SERVES	REFERENCE MAKE	MODEL	AIR FLOW CFM	EXT SP IN WG	MAX. OV FPM	DRIVE	MAX. FAN MOTOR RPM	MOTOR		AMCA DESIGNATION			ACCESSORIES
												PHASE	HP	ARR.	DISCH.	MOTOR POSITION	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	EF-1	PROPELLER FAN	EXHAUST AIR	TOILETS	SEE NOTE -1	–	150	–	2000	DIRECT	1440	1	–	–	–	–	
2	EF-2	CENTRIFUGAL INLINE	EXHAUST AIR	TOILETS	SEE NOTE -1	–	600	0.50	2000	DIRECT	1440	1	–	–	–	–	
3	EF-3	CENTRIFUGAL INLINE	EXHAUST AIR	TOILETS	SEE NOTE -1	–	800	0.75	2000	DIRECT	1440	1	–	–	–	–	
4	EF-4	PROPELLER FAN	EXHAUST AIR	ANATOMY LAB/ PARKING	SEE NOTE -1	–	1500	–	2000	DIRECT	1440	1	–	–	–	–	
5	EF-5	PROPELLER FAN	EXHAUST AIR	STORE	SEE NOTE -1	–	500	–	2000	DIRECT	1440	1	–	–	–	–	
6	EF-6	CENTRIFUGAL INLINE	EXHAUST AIR	DINING	SEE NOTE -1	–	1400	0.55	2000	DIRECT	1440	1	–	–	–	–	
7	EF-7	CENTRIFUGAL INLINE	EXHAUST AIR	KITCHEN	SEE NOTE -1	–	2000	1.00	2000	BELT	1440	3	–	–	–	–	
8	EF-8	CENTRIFUGAL INLINE	EXHAUST AIR	LAB	SEE NOTE -1	–	2100	2.00	2000	BELT	1440	3	–	–	–	–	
9	EF-9	CENTRIFUGAL INLINE	EXHAUST AIR	STORE	SEE NOTE -1	–	2000	0.75	2000	BELT	1440	3	–	–	–	–	
10	SF-1	CENTRIFUGAL INLINE	SUPPLY AIR	STAIR CASE/ ELEVATOR SHAFT PRESSURIZATION	SEE NOTE -1	–	11000	1.00	2000	BELT	1440	3	–	–	–	–	
11	SF-2	CENTRIFUGAL INLINE	SUPPLY AIR	STAIR CASE PRESSURIZATION	SEE NOTE -1	–	7500	1.00	2000	BELT	1440	3	–	–	–	–	

NOTES:

1. FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE "LIST OF APPROVED/RECOMMENDED MANUFACTURERS"
2. SOUND POWER LEVEL OF ALL FANS AT DISCHARGE SHALL NOT EXCEED 85 db.
3. STAIRCASE/ELEVATOR PRESSURIZATION FANS' MOTOR SHALL BE VFD COMPATIBLE. MOTOR SHALL BE INSULATION CLASS H AND EFFICIENCY CLASS IE3



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ACADEMIC BLOCK

AIR INLETS/OUTLETS

EQUIPMENT SCHEDULE

CODE	TYPE	DESCRIPTION	SERVICE	MATERIAL	REFERENCE MAKE/MODEL	WITH DAMPER	FINISH	COLOUR	ACCESSORIES	REMARKS
1	2	3	4	5	6	7	8	9	10	11
A	CEILING DIFFUSER	FOUR-WAY CEILING SUPPLY AIR DIFFUSER SQUARE/ RECTANGULAR FACE	SUPPLY	ALUMINUM EXTRUDED	T & B * SEE NOTE - 1	YES	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	
B	CEILING DIFFUSER	FOUR-WAY CEILING EXHAUST AIR DIFFUSER SQUARE/ RECTANGULAR FACE	RETURN/ EXHAUST	ALUMINUM EXTRUDED	T & B * SEE NOTE - 1	YES	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	
C	GRILLE	AIR GRILLE DOUBLE DEFFLECTION ADJUSTABLE BARS	RETURN AIR	ALUMINUM	T & B * SEE NOTE - 1	YES	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	
D	LOUVER	OUTDOOR/EXHAUST AIR LOUVER WITH ANTI BIRD WIRE MESH	OUTDOOR AIR	ALUMINUM	T & B * SEE NOTE - 1	NO	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	

NOTES:

1. FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE "LIST OF APPROVED/RECOMMENDED MANUFACTURERS"

* TUTTLE & BAILEY

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LTD. NESPAK ISLAMABAD

SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY (SZABMU), ISLAMABAD

ACADEMIC BLOCK

FILTERS

EQUIPMENT SCHEDULE

SHEET 16 of 17

1	CODE	F
2	SERVICE	OUTDOOR AIR
3	TYPE OF FILTER BOX	DUCT MOUNTED
4	THICKNESS (IN)	2
5	CFM	AS PER DRAWINGS
6	MAXIMUM FACE VELOCITY (FPM)	500
7	NO. OF SECTIONS	AS REQUIRED
8	SIZE OF EACH SECTION (MAX) (IN * IN)	AS PER DRAWINGS
	(i) NO. OF FILTER	AS PER DRAWINGS
9	MAKE	
	a) FILTER BOX	-
	b) FILTER MEDIA	-
10	COUNTRY OF MANUFACTURE	
	a) FILTER BOX	-
	b) FILTER MEDIA	-
11	MAXIMUM PRESSURE DIFFERENCE (CLEAN) IN. WG	0.05
12	TYPE OF FILTER	WASHABLE METALLIC
13	EFFICIENCY	AS SPECIFIED
14	REMARKS	

PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

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ACADEMIC BLOCK

HEPA FILTERS

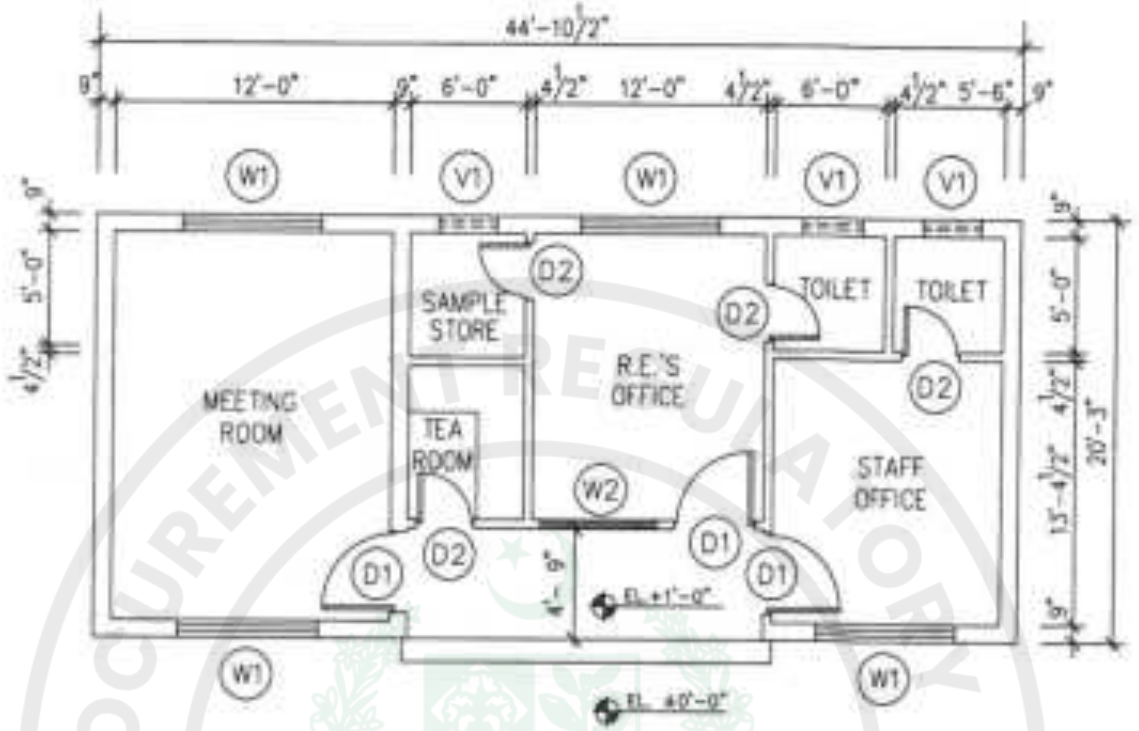
1	CODE	HF-01	HF-2-1	HF-2-2
2	SERVICE	EXHAUST AIR	SUPPLY AIR	RETURN AIR
3	TYPE OF FILTER BOX	DUCT MOUNTED	DUCT MOUNTED	DUCT MOUNTED
4	TYPE OF FILTER	HEPA	HEPA	HEPA
5	EFFICIENCY	H13 OR ABOVE	H13 OR ABOVE	H13 OR ABOVE
6	THICKNESS (IN)	-	-	-
7	CFM	2000	11235	11235
8	MAXIMUM FACE VELOCITY (FPM)	500	500	500
9	NO. OF SECTIONS	AS REQUIRED	AS REQUIRED	AS REQUIRED
10	SIZE OF EACH SECTION (MAX) (IN * IN)	AS PER DRAWINGS	AS PER DRAWINGS	AS PER DRAWINGS
	(i) NO. OF FILTER	AS PER DRAWINGS	AS PER DRAWINGS	AS PER DRAWINGS
11	MAKE			
	a) FILTER BOX	IMPORTED	IMPORTED	IMPORTED
	b) FILTER MEDIA	IMPORTED	IMPORTED	IMPORTED
12	COUNTRY OF MANUFACTURE			
	a) FILTER BOX	-	-	-
	b) FILTER MEDIA	-	-	-
13	FINAL PRESSURE DROP FOR FILTER SUBSTITUTION IN WG	2.4	2.4	2.4
14	REMARKS			

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA)
EPADS

SITE OFFICE

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SITE OFFICE DETAILS



SITE OFFICE NOTES

1. ROOF SYSTEM SHALL BE OF PRE CAST CONCRETE ROOFING SYSTEM SLOPING TO ONE SIDE WITH A MINIMUM HEIGHT OF 11'-0" WITH THERMOPORE FALSE CEILING.
2. BOTH INTERNAL & EXTERNAL SIDES OF THE WALLS SHALL BE PLASTERED WITH 1:4 C.S. MORTAR.
3. INTERNAL WALLS SHALL BE PAINTED WITH SPD WITH LIME WASH ON THE EXTERIOR.
4. CEMENT CONCRETE FLOORING SHALL BE PROVIDED IN ALL ROOMS.
5. CERAMIC TILE FLOORING WITH CERAMIC TILE DADO UPTO 5'-0" SHALL BE PROVIDED IN ALL TOILETS & TEA ROOM.
6. THE SITE OFFICE SHALL HAVE ITS INDIPENDENT O/H WATER TANK OF AT LEAST 500 GALLON CAPACITY.
7. THE SITE OFFICE SHALL BE AIR CONDITIONED IN SUMMER AND HEATED IN WINTER.

SCHEDULE OF DOORS & WINDOWS

D1	3'-6" x 7'-0"	DEODAR WOOD FRAME & FLUSH SHUTTERS WITH COMMERCIAL PLY (PAINTED).
D2	2'-6" x 7'-0"	
W1	6'-0" x 4'-0"	STEEL 2 SECTION WINDOWS & VENTILATORS WITH FIXED FLY PROOFING (PAINTED) & 5mm THICK PLAIN OR FROSTED (IN TOILET AREAS) GLASS.
W2	5'-0" x 4'-0"	
V1	2'-6" x 2'-0"	

SZABMU, ISLAMABAD	ACADEMIC BLOCK FOR SZABMU ISLAMABAD – HVAC WORKS	TITLE: SITE OFFICE	
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ISLAMABAD		SCALE: N.T.S DATE: OCT. 2025	NO. / REV.

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CONSTRUCTION EXPERIENCE

Form EXP - 4.1
General Construction Experience

Bidder's Name: _____
Date: _____
JV Member's Name_____
Bid Reference No. (if any) and title: _____
Page _____of _____pages

Starting Year	Ending Year	Contract Identification	Role of Bidder
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of EMPLOYER: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of EMPLOYER: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of EMPLOYER: _____ Address: _____	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form EXP - 4.2(a)

Specific Construction and Contract Management Experience

Bidder's Name: _____
Date: _____
JV Member's Name_____
Bid Reference No. (if any) and title: _____
Page _____of _____pages

Similar Contract No.	**Information**			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			PKR equivalent	
If member in a JV or sub-contractor, specify participation in total Contract amount				
EMPLOYER's Name:				
Address: Telephone/fax number E-mail:				

Form EXP - 4.2(a) (cont.)
Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	**Information**
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form EXP - 4.2(b)
Construction Experience in Key Activities

Bidder's Name: _____
Date: _____
Bidder's JV Member Name: _____
Sub-contractor's Name (if any): _____
Bid Reference No. (if any) and title: _____

Page _____of _____pages

All Sub-contractors for key activities must complete the information and Qualification Criteria and Requirements, Sub-Factor 4.2.

1. Key Activity No One: _____

	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			PKR equivalent	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				
EMPLOYER's Name:				
Address: Telephone/fax number				

	Information
E-mail:	

2. Activity No. Two

3. ……

	Information
Description of the key activities in accordance with Section III:	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form EXP - 4.2 (c)
Specific Experience in Managing ES aspects

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

Bidder's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insertfull name]*
Bid Reference No. (if any) and title: *[insert ICB/NCB number and title]*
Page *[insert page number]* of *[insert total number]* pages

1. Key Requirement no 1 in accordance with 4.2 (c): _____

Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Subcontractor ☐
Total Contract Amount			PKR	
Details of relevant experience				

2. Key Requirement no 2 in accordance with 4.2 (c): _____

3. Key Requirement no 3 in accordance with 4.2 (c): _____

4. [PA define key requirements]

Contractor's Representative and Key Personnel Schedule

Bidders should provide the names and details of the suitably qualified Contractor's Representative and Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

Contractor' Representative and Key Personnel

1.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
2.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
3.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
4.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]

	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
5.	**Title of position:**	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
6.	**Title of position:** *[insert title]*	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]

Form PER-2:
Resume and Declaration
Contractor's Representative and Key Personnel

Name of Bidder

Position [*#1*]: [*title of position from Form PER-1*]		
Personnel information	**Name:**	**Date of birth:**
	Address:	**E-mail:**
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency:*[language and levels of speaking, reading and writing skills]*	
details		
	Address of Employer:	
	Telephone:	**Contact (manager / personnel officer):**
	Fax:	
	Job title:	**Years with present Employer:**

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

Project	**Role**	**Duration of involvement**	**Relevant experience**
[main project details]	*[role and responsibilities on the project]*	*[time in role]*	*[describe the experience relevant to this position]*

Declaration

I, the undersigned *[insert either "Contractor's Representative" or "Key Personnel" as applicable]* , certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Bid:

Commitment	**Details**
Commitment to duration of contract:	*[insert period (start and end dates) for which this Contractor's Representative orKey Personnel is available to work on this contract]*
Time commitment:	*[insert period (start and end dates) for which this Contractor's Representative orKey Personnel is available to work on this contract]*

I understand that any misrepresentation or omission in this Form may:

(a) be taken into consideration during Bid evaluation;

(b) result in my disqualification from participating in the Bid;

(c) result in my dismissal from the contract.

Name of Contractor's Representative or **Key Personnel: [*insert name*]**

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Bidder:

Signature: _____

Date: (day/month/year): _____

Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Eligibility and Qualification Criteria.

No.	**Source of financing**	**Amount (Eq. PKR)**
1		
2		
3		

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Past Experience / Contracts

Contracts over *[insert amount]* during the last three years:				
Procuring Agency	Value	Year	Goods/Services Supplied	Country of Destination

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Historical Contract Non-Performance, and Pending Litigation and Litigation History

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

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

☐ Not debarred due to deviation from commitment of Bid Securing Declaration-☐ Not debarred due to non-performance			
Year	**Non-performed portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and PKR equivalent)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Reason(s) for nonperformance: *[indicate main reason(s)]*	*[insert amount]*
Pending Litigation, in accordance with Section III, Qualification Criteria and Requirements			
☐ Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3 as indicated below.			

Year of dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), ~~US$~~ PKR Equivalent (exchange rate)**

[insert year]	*[insert amount]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Agency" or "Supplier"]* Status of dispute: *[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]*	*[insert amount]*

☐ No consistent history of court/arbitral award decisions in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4.

☐ Consistent history of court/arbitral award decisions in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4 as indicated below.

Year of award	**Outcome as percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (currency), PKR Equivalent (exchange rate)**
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Agency" or "Supplier"]* Court/ arbitral award decision: *[Indicate if the award decision was against the Applicant or any member of a joint venture.]y]*	*[insert amount]*

Current Contract Commitments / Works in Progress

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

Current Contract Commitments					
No.	Name of Contract	**Employer's Contact Address, Tel, Fax**	**Value of Outstanding Work [Current Eq. PKR]**	**Estimated Completion Date**	**Average Monthly Invoicing Over Last Six Months [Eq. PKR/month)]**
1					
2					
3					
4					
5					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Financial Situation and Performance

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

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

1. Financial data

Type of Financial information in (currency)	**Historic information for previous _[insert number] years, [insert in words] (amount in currency, currency, exchange rate*, PKR equivalent)**				
	Year 1	Year 2	Year 3		
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

* Refer ITA 14 for the exchange rate

3. Financial documents

The Applicant and in case of JV, members of JV shall provide copies of financial statements for *[number]* years pursuant Section III, Qualifications Criteria and Requirements. The financial statements shall:

(a) reflect the financial situation of the Applicant or in case of JV member, and not an affiliated entity (such as parent company or group member).

(b) be independently audited or certified in accordance with local legislation.

(c) be complete, including all notes to the financial statements.

(d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements[1] for the *[number]* years required above; and complying with the requirements.

[1] If the most recent set of financial statements is for a period earlier than 12 months from the date of Application, the reason for this should be justified.

Average Annual Turnover (Annual Sales Value)

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

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

Annual Turnover Data			
Year	**Amount** **Currency**	**Exchange rate*** **(If applicable)**	**PKR equivalent**
[indicate calendar year]	*[insert amount and indicate currency]*		
		Average Annual Turnover **	

* Refer ITA for date and source of exchange rate.

** Total PKR equivalent for all years divided by the total number of years. See Section III, Qualification Criteria and Requirements, ITA.