Sukkur IBA University

BIDDING DOCUMENTS

FOR

"CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR"

December, 2025

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INVITATION FOR BIDS

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Sukkur IBA University
www.iba-suk.edu.pk

NOTICE INVITING TENDER (THROUGH EPADS)
Tender Proc/EPADS/0076

Sukkur IBA University invites bids on Composite Schedule of Rates (CSR)/item rate basis electronically through EPADS (E-Pak Acquisition & Disposal System) on a single stage Two envelope procedure from the eligible and experienced firms registered with Pakistan Engineering council (PEC), Income tax & Sales tax and Sindh Revenue Board (whichever is applicable) departments for the following works. Manual bids will not be considered.

S. No.	Name of Work	Estimated Cost Rs. in Million	Bid Security Cost Rs. in Million	Time for completion
01	Construction of Hostel Block at IBA Public School Sukkur	95.20	2.00	12 Months
02	Construction of Admin Block at IBA Public School Sukkur	95.209	2.00	12 Months

Tender Schedule - Date and Time

	From	To	Submission	Opening
01	December 27, 2025	January 13, 2026	13-01-2026 03:00 PM Through EPADS	13-01-2026 03:30 PM Through EPADS

1. Eligibility:

I. Valid license by the Pakistan Engineering Council (PEC) in the category C-4 or above with Specialized code, CE-09, CE-10(I), EE-11(vi).

ii. Valid registered License from Electric Inspector for Electrical Works issued by Govt. of Sindh (Sukkur Region). If the license is expired, copy of renewal challan to be attached.

iii. Bidder must have valid registration with Income Tax and applicable Sales Tax along with Active Taxpayer Status.

iv. Bidders must have an average annual turnover as per (FBR tax returns) for the last five years that should be more than or equal to the estimated cost of the work.

v. An affidavit (on non-judicial stamp paper) declaring that there is no litigation history, no blacklisting, and no involvement in any corrupt, fraudulent, or collusive practices. The affidavit shall also include an undertaking that all information and documents provided are true and correct. If, at any stage, the information is found to be bogus, fake, forged, or counterfeit, action shall be taken in accordance with the applicable rules.

vi. Affidavit on (non-judicial stamp paper) for Bidder must not have forfeited CDR/or bid security with the procurement agency Sukkur IBA University.

2. Terms and Conditions:

(a) Under the following conditions, the bid will be rejected: -

i. Conditional bids/tenders.

ii. Bids not accompanied by a bid security of the required amount and form.

iii. Blacklisted firms.

(b) Bid validity Period: 90 days.

Bidding documents can be obtained and submitted through EPADS as per the above schedule. Bidders are requested to give their Best and Final Price, as "No Negotiations" is permitted. Bidding Documents containing detailed terms and conditions can be downloaded from the following websites & submitted electronically through EPADS.

https://portalsindh.eprocure.gov.pk, www.iba-suk.edu.pk

The procuring agency reserves the right to accept or reject any or all bids prior to the acceptance of a bid as per SPP Rules 2010 (Amended to date).

In case of any query/confusion, please email at: pd@iba-suk.edu.pk

PROJECT DIRECTOR

SUKKUR IBA UNIVERSITY

Nisar Ahmed Siddiqui Road, Sukkur.
Ph: 071-5644025-26/0333-2671527, Fax: 071-5804419

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NBK CONSULTANTS CONSULTING ENGINEERS ARCHITECT & PLANNERS

INVITATION FOR BIDS

Date:_____
Bid Reference No.: _____

1. The Project Director, Sukkur IBA University invites sealed bids, under Single Stage-Two envelope through EPADS-SPPRA bidding procedure, from eligible firms or persons holding a valid Pakistan Engineering Council license in the category C4 or above & registered in relevant disciplines CE-09, CE-10(i), EE-11(vi), for the work under ADP Project titled "Construction of Admin Block at IBA Public School Sukkur" with the completion period of 12 months.
2. Eligible Bidders may obtain further information, inspect and acquire the Bidding Documents from the Office of the Employer, i.e., Office of the Project Director, Sukkur IBA University.
3. The financial proposals of only technically eligible/qualified bidders will be opened. Technical proposals should not include any financial proposal information except the earnest money mentioned in the NIT.
4. The Tenders should be submitted along with the above required documentation / Information. If any of such required documents/information are lacking, then the tender will not be considered by the procuring committee, and no such documents will be accepted after the dropping date and time via EPADS/SPPRA.
5. All bids must be accompanied by a Bid Security Rs: 2,000,000.0 in the form of pay order/bank guarantee from the scheduled bank to be attached with technical proposal. Interested firms are requested to submit their duly completed bids by 3:00 PM on or before **(as mentioned in Tender Notice)** via EPADS SPPRA. The bids will be opened on the same day at 3:30 pm online in the presence of University Procurement Committee.
6. Issuance, submission, and opening of bids will be conducted online through EPADS/SPPRA only. Any references in this bidding document to the manual submission of documents should be interpreted as referring to the online process for "Issuance, Submission, and Opening."
7. Bidders are hereby informed that proposals submitted as Joint Ventures (J.V) will not be accepted. Each bidder must submit their proposal as an individual entity. Any information in this bidding document referring to proposal submission in a Joint Venture (J.V) shall be considered not applicable.
8. Bidders are informed that cartage will not be payable separately and that the bid offered includes the cost of cartage. Therefore, bidders are advised to quote their premium accordingly.
9. The Schedule of Rates/B.O.Q Items will be exercised in accordance with the order issued by office of the Chief Engineer, Buildings Department, Govt. of Sindh, Vide NO:SCHEDULE/RATES-T(ii)/D.S/1385 Dated: 24-10-2024.
10. The escalation under the PEC Price Adjustment Formula clause shall be considered *not applicable.*

INSTRUCTIONS
TO
BIDDERS

INSTRUCTIONS TO BIDDERS

(Note: These Instructions to Bidders along with Bidding Data Sheet will not be part of the Contract and will cease to have effect once the contract is signed.)

A. GENERAL

IB.1 Scope of Bid

1.1 The Employer as defined in the Bidding Data Sheet hereinafter called "the Employer" wishes to receive bids for the construction and completion of works as described in these Bidding Documents, and summarized in the **Bidding Data Sheet** hereinafter referred to as the "Works".

1.2 The successful bidder will be expected to complete the Works within the time specified in **Bidding Data**.

IB.2 Source of Funds

2.1 The project will be funded from approved scheme titled "**CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR**" **(SDD 4) (Revised) ADP No.566 SEDMI-PP-23-0234 FY 2025-26**.

IB.3 Eligible Bidders

3.1 This Invitation for Bids is open to all bidders meeting the following requirements:

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

- Valid licensed by the Pakistan Engineering Council (PEC) in the category C-4 or above with Specialized code, CE-09, CE-10(i), EE-11(vi).
- Valid Registered License from Electric Inspector for Electrical Works issued by Govt. of Sindh – (Sukkur Region). If the License is expired, copy of renewal challan to be attached.
- Bidder must have valid registration with Income Tax and applicable Sales Tax along with Active Taxpayer Status.
- Bidders must have an average annual turnover as per (FBR tax returns) for the last five years that should be more than or equal to the estimated cost of the work.
- An affidavit (on non-judicial stamp paper) declaring that there is no litigation history, no blacklisting, and no involvement in any corrupt, fraudulent, or collusive practices. The affidavit shall also include an undertaking that all information and documents provided are true and correct. If, at any stage, the information is found to be bogus, fake, forged, or counterfeit, action shall be taken in accordance with the applicable rules.
- Affidavit on (non-judicial stamp paper) for Bidder must not have forfeited CDR/or bid security with the procurement agency Sukkur IBA University.

IB.4 One Bid per Bidder

4.1 Each bidder shall submit only one bid either by himself, or as a partner in a `. A bidder who participates in more than one bid (other than alternatives pursuant to Clause IB.16) will be disqualified.

IB.5 Cost of Bidding

5.1 The bidders shall bear all costs associated with the preparation and submission of their respective bids and the Employer will in no case be responsible or liable for those costs,

regardless of the conduct or outcome of the bidding process.

5.2 No separate payment for cartage will be made to the successful bidder. The bidder is required to quote the premium inclusive of the cost of carriage of materials.

IB.6 Site Visit

6.1 The bidders are advised to visit and examine the Site of Works and its surroundings and obtain for themselves on their own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. All cost in this respect shall be at the bidder's own expense.

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

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

7.1 The Bidding Documents, in addition to invitation for bids, are those stated below and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.

1. Instructions to Bidders.
2. Bidding Data Sheet.
3. General Conditions of Contract, Part-I(GCC).
4. Particular Conditions of Contract, Part-II(PCC).
5. Specifications – Special Provisions.
6. Specifications – Technical Provisions.
7. Form of Bid & Appendices to Bid.
8. Bill of Quantities (Appendix-D to Bid).
9. Form of Bid Security.
10. Form of Contract Agreement.
11. Forms of Performance Security and Mobilization Advance Guarantee/Bond and Form of Indemnity Bond for Secured Advance.
12. Drawings.

7.2 The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the Bidder's own risk. Pursuant to Clause IB.26, bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.8 Clarification of Bidding Documents

8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which he receives earlier

than 28 days prior to the deadline for submission of bids.
Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

IB.9 Amendment of Bidding Documents

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

9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to IB 7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.

9.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids in accordance with Clause IB.20

C. PREPARATION OF BIDS

IB.10 Language of Bid

10.1 The bid and all correspondence and documents related to the bid exchanged by a bidder and the Employer shall be in the bid language stipulated in the **Bidding Data** Sheet and Particular Conditions of Contract. Supporting documents and printed literature furnished by the bidders may be in any other language provided the same are accompanied by an accurate translation of the relevant parts in the bid language, in which case, for purposesof evaluation of the bid, the translation in bid language shall prevail.

IB.11 **Documents Comprising the Bid through EPADS:**

11.1 Each bidder shall:

a) submit a written power of attorney authorizing the signatory of the bid to act for and on behalf of the bidder;
b) Update the information indicated and listed in the **Bidding Data.**
And

c) furnish a technical proposal taking into account the various Appendices to Bid specially the following:
Appendix-E to Bid Proposed Construction Schedule
Appendix-F to Bid Method of Performing the Work
Appendix-G to Bid List of Major Equipment
Appendix-K to Bid Organization Chart for Supervisory Staff
and other pertinent information such as mobilization programme etc.

11.2 ~~Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the bid, together~~

with a copy of the proposed agreement. The role to be played by each partner to be specified therein. Bids submitted by a joint venture of two (2) or more firms shall comply with the following requirements:

(a) In case of a successful bid, the Form of JV Agreement shall be signed so as to be legally binding on all partners within 7 days of the receipt of letter of acceptance failing which the contract and the letter of acceptance shall stand void and redundant.

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

(c) The partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of JV Agreement and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;

(d) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para (b) above as well as in the Form of Bid and in the Form of JV Agreement (in case of a successful bid); and

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

11.3 The Bidder shall furnish, as part of the Technical Bid, a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders" proposal to meet the work requirements and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

12.1 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in IB 1.1 hereof, based on the unit rates and / or prices submitted by the bidder.

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

12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be

included in the rates and prices and the total Bid Price submitted by a bidder.
Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.

12.4 The rates and prices quoted by the bidders are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 70 of the Conditions of Contract. The bidders shall furnish the prescribed information for the price adjustment formulae in Appendix C to Bid and shall submit with the bids such other supporting information as required under the said clause.

IB.13 Currencies of Bid and Payment

13.1 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 supplied from outside the Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. 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 thebidder'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. *(Note: Clause IB.13.1 may be amended that the payment will be made to the contractor by the client in Pakistani Rupees for whatsoever item quoted in bid, purchased / supplied).*

13.2 The rates of exchange to be used by the bidder for currency conversion shall be the TT & OD Selling Rates published or authorized by the State Bank of Pakistan prevailing on the date 28 days prior to the deadline for submission of bids. For the purpose of payments, the exchange rates used in bid preparation shall apply for the duration of the Contract.

IB.14 Bid Validity

14.1 Bids shall remain valid for the period stipulated in the Bidding Data Sheet after the Date of Bid Opening specified in Clause IB.23.

14.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period which shall in no case be more than the original bid validity period. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiting his Bid Security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects.

IB.15 Bid Security

15.1 Each bidder shall furnish, as part of his bid, a Bid Security in the amount stipulated in the Bidding Data Sheet in Pak Rupees or an equivalent amount in a freely convertible currency.

15.2 The Bid Security shall be, at the option of the bidder, in the form of Deposit at Call or a Bank Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favor of the Employer valid for a period 28

days beyond the Bid Validity date.

15.3 Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive.

15.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 28 days after the expiration of the period of Bid Validity.

15.5 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security and signed the Contract Agreement.

15.6 The Bid Security may be forfeited:

(a) If the bidder withdraws his bid except as provided in IB 22.1;
(b) If the bidder does not accept the correction of his Bid Price pursuant to IB 27.2 hereof; or
(c) In the case of successful bidder, if he fails within the specified time limit to:
  (i) Furnish the required Performance Security;
  (ii) Sign the Contract Agreement, or
  (iii) Furnish the required JV agreement within 7 days of the receipt of letter of acceptance.

IB.16 Alternate Proposals by Bidder.

16.1 Should any bidder consider that he can offer any advantages to the Employer by a modification to the designs, specifications or other conditions, he may, in addition to his bid to be submitted in strict compliance with the Bidding Documents, submit any Alternate Proposal(s) containing (a) relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details /Conditions provided always that the total sum entered on the Letter of Price Bid shall be that which represents complete compliance with the Bidding Documents. The technical details and financial implication involved are to be submitted in two separate sealed envelopes as to be followed in main bid proposals.

NOT APPLICABLE

16.2 Alternate Proposal(s), if any, of the lowest evaluated responsive bidder only may be considered by the Employer as the basis for the award of Contract to such bidder.

IB.17 Pre-Bid Meeting

17.1 The Employer may, on his own motion or at the request of any prospective bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents. The date, time and venue of pre-bid meeting, if convened, is as stipulated in the **Bidding Data** Sheet. All prospective bidders or their authorized representatives shall be invited to attend such a pre-bid meeting.

17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than three (03) days before the proposed pre-bid meeting.

17.3 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given will be transmitted without delay to all purchasers of the Bidding Documents. Any

modification of the Bidding Documents listed in IB 7.1 hereof, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and not through the minutes of the pre-bid meeting.

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

IB.18 Format and Signing of Bid

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

18.2 All appendices to Bid are to be properly completed and signed.

18.3 No alteration is to be made in the Letters of Price and Technical Bids nor in the Appendices thereto except in filling up the blanks as directed. If any such alterations be made or if these instructions be not fully complied with, the bid may be rejected.

18.4 The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid as described in Bidding Data Sheet against IB 11 and clearly mark it "ORIGINAL - TECHNICAL BID" and "ORIGINAL - PRICE BID". In addition, the Bidder shall submit two (2) copies of the Bid and clearly mark each of them "COPY."In the event of any discrepancy between the original and the copies, the original shall prevail.

18.5 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the Bidding Data Sheet and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid, except for unamended printed literature, shall be signed or initialed by the person signing the bid.

18.6 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

18.7 Bidders shall indicate in the space provided in the Letter of Technical and Price Bids, their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their bids and the Contract is to be sent.

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

D. SUBMISSION OF BIDS FOR SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE

IB.19 Sealing and Marking of Bids

19.1 Each bidder shall submit his bid as under:

a) **All bids will be submitted online via EPADS/SPPRA; therefore, the sub-clauses related to manual submission are not applicable. However, bidders are required to submit one hard copy of the Technical Proposal (optional), sealed as per the prescribed rules, to facilitate the Procuring Committee in evaluating the proposals. In case of any discrepancy between the online submitted proposal and the hard-**

copy version, the decision will be made based on the online submitted Technical Proposal.

19.2 ~~ORIGINAL and each copy of the Bid shall be separately sealed and put in separate envelopes and marked as such.~~

19.3 ~~The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in IB 19.2 hereof.~~

19.4 ~~The technical bid should comprise of documents listed in IB11.1 (A) & the price bid should comprise of documents listed in IB 11.1 (B) which shall be placed in single envelopes in accordance with IB 11.1.~~

19.5 ~~The inner and outer envelopes shall:~~

19.6 ~~Be addressed to the Employer at the address provided in the Bidding Data Sheet;~~

19.7 ~~Bear the name and identification number of the contract as defined in the Bidding Data Sheet; and~~

19.8 ~~Provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data Sheet.~~

19.9 ~~In addition to the identification required in IB 19.2 hereof, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause IB.21~~

19.10 ~~If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.~~

IB.20 Deadline for Submission of Bids

20.1 (a) All Bids will be made online via EPADS/SPPRA and Bids must be received by the Employer no later than the time and date stipulated in the Bidding Data Sheet.

~~(b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims will be entertained for refund of such expenses.~~

~~(c) Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.~~

~~(d) Upon request, acknowledgment of receipt of bids will be provided to those making delivery in person or by messenger.~~

20.2 The Employer may, at his discretion, extend the deadline for submission of Bids by issuing an amendment in accordance with Clause IB.9, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be

subject to the deadline as extended.

IB.21 Late Bids

21. (a) Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 will be returned unopened to such bidder ***(Note: N/A in online submissions)***.

(b) Delays in the mail, delays of person in transit, or delivery of a bid to the wrong office shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder's responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification, Substitution and Withdrawal of Bids

~~22. 1 Any bidder may modify, substitute or withdraw his bid after bid submission provided that the modification, substitution or written notice of withdrawal is received by the Employer prior to the deadline for submission of bids.~~

~~22.2 The modification, substitution, or notice for withdrawal of any bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" as appropriate.~~

~~22.3~~ No bid may be modified by a bidder after the deadline for submission of bids except in accordance with IB 22.1 and 27.2.

~~22.4~~ Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Clause IB.15.

22A.1. Technical Proposal

22A.1. Technical proposal must include the complete solution proposed by the Bidder

22A.2. If the specification sheets ask for any detail, those should be provided as attachment to the Technical Proposal.

22A.3 Technical proposal comprises of manufacturing process, from cutting to molding, assembling and finishing detailing all the equipment to be used for the manufacture of items.

22A.4 Description of material.

22A.5. Completion schedule on Bar chart, Primavera or other software.

22A.6 Technical proposal shall provide the details of company, complete factory details etc.

22A.7. Minimum marks to qualify/Pass technical proposal is 70.

22A.8. Financial Proposal of only those Bidders will be considered whose Technical Proposal qualify.

22A.9. Bidders must possess the valid PEC license in such category in which the total bid cost falls, if not than his financial proposal will be rejected.

22A.10 The Bidder shall furnish earnest money amounting **PKR.2.0 million** of the total value of bid in the form of Bank Draft issued by a scheduled bank of Pakistan in favor of **"Sukkur IBA University"** along with financial proposal. No **Bid shall be entertained without earnest money**. Earnest money of the successful bidder will be released after defect liability & maintenance period.

22B. Financial Proposal

22B.1. Financial proposal will include the prices quoted for each item (including all taxes).

22B.2. For each category the quoted prices must include all taxes, customs and freight charges for delivery at the required locations at own risk and cost along with installation and assembling.

22B.3. As items are for educational institution, Sukkur IBA University thereof expects significant educational and volume discounts from principal supplier.

Financial proposal of the bidders found technically non-responsive will be returned unopened.

- **BID OPENING AND EVALUATION FOR SINGLE STAGE TWO ENVELOPEBIDDING PROCEDURE through EPDS/SPPRA Issuance & submission of bidding documents to be done through EPADS. EPADS must be written/highlighted with issuance/submission of documents.**

IB. 23 Bid Opening

23.1 The Employer will open the bids, including withdrawals, substitution and modifications made pursuant to Clause IB.22, in the presence of bidders" representatives who choose to attend, at the time, date and location stipulated in the Bidding Data. The bidder's representatives who are present shall sign a register evidencing their attendance.

23.2 ~~Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.22 shall not be opened.~~

23.3 ~~The bidder's name, total Bid Price and price of any Alternate Proposal(s), any discounts, bid modifications, substitution and withdrawals, the presence or absence of Bid Security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening of bids.~~

23.4 Employer shall prepare minutes of the bid opening, including the information disclosed to those present in accordance with the Sub-Clause 23.3.

IB.24 Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of bid evaluation report which shall be done at least ten 07 days prior to issue of Letter of Acceptance. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices, and recommendations against all the bids evaluated. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of such bidder's bid. Whereas any bidder feeling aggrieved may lodge a written complaint not later than fifteen (15) days after the announcement of the bid evaluation report. However mere

fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

25.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at his discretion, ask any bidder for clarification of his bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause IB.28.

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

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.

26.2 A substantially responsive bid is one which (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by the required Bid Security; (iv) Includes signed Integrity Pact where required as per clause IB.35 and (v) conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one (i) which affect in any substantial way the scope, quality or performance of the Works; (ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidders obligations under the Contract; (iii) adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids. Only substantially responsive bid shall be considered for further evaluation.

26.3 If a bid is not substantially responsive, it may not subsequently be made responsive by correction or withdrawal of the non-conforming material deviation or reservation. The Employer may, however, seek confirmation/ clarification in writing which shall be responded in writing.

IB.27 Correction of Errors

27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

(a) Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and

(b) Where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line-item total as quoted will govern and the unit rate will be corrected.

27.2 The amount stated in the Letter of Price Bid will be adjusted by the 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 Bid Price, his Bid will be rejected, and the Bid Security shall be forfeited in accordance with IB.15.6 (b) hereof.

IB.28 Evaluation and Comparison of Bids

DETAILED TECHNICAL EVALUATION CRITERIA

S.No.	Category	Weightage/ Marks/ Points	
		Maximum	**Minimum A**
1.	Professional Experience Record	40	70
2.	Financial Soundness	25	
3.	Personnel Capabilities	15	
4.	Equipment Capabilities	20	
	Total:	**100**	**70**

*Note: To qualify, applicants must receive not less than **70%** points of maximum 100 points.*
If two or more than two bidders quote the same price and the situation of tie up has arisen then work shall be awarded to the bidder having higher technical soundness.

1. Eligibility Criteria

All the applicants shall be subjected to initial scrutiny using the following criteria:

- Valid licensed by the Pakistan Engineering Council (PEC) in the category C-4 or above with specialized code, CE-09, CE-10(i), EE-11(vi).
- Valid Registered License from Electric Inspector for Electrical Works issued by Govt. of Sindh – (Sukkur Region). If the License is expired, copy of renewal challan to be attached.
- Bidder must have valid registration with Income Tax and applicable Sales Tax along with Active Taxpayer Status.
- Bidders must have an average annual turnover as per (FBR tax returns) for the last five years that should be more than or equal to the estimated cost of the work.
- An affidavit (on non-judicial stamp paper) declaring that there is no litigation history, no blacklisting, and no involvement in any corrupt, fraudulent, or collusive practices. The affidavit shall also include an undertaking that all information and documents provided are true and correct. If, at any stage, the information is found to be bogus, fake, forged, or counterfeit, action shall be taken in accordance with the applicable rules.
- Affidavit on (non-judicial stamp paper) for Bidder must not have forfeited CDR/or bid security with the procurement agency Sukkur IBA University.

2. Professional Experience Record

Experience for Projects Completed will be evaluated as below.

General

(Information regarding similar / comparable projects completed is to be supported

by documents such as Taking over / Completion Certificate, Maintenance / Defects Liability Certificate and any other relevant document).

Sr. No.	Description	Maximum Points
1.	Experience in similar nature of work(s) executed during the last five years: i. At least one similar nature of work having minimum cost 80% of the estimated cost of the work; or ii. At least two similar nature works each having minimum cost 50% of the estimated cost. Completion Certificates & Work Orders issued by the Procuring Agency must be attached. **(10 Marks for one project, 10 for each additional project)**	20
2	Experience in similar nature of work(s) (In Hand): i. At least one similar nature of work having minimum cost 80% of the estimated cost of the work; or ii. At least two similar nature works each having minimum cost 50% of the estimated cost. Satisfactory performance & Work Orders issued by the Procuring Agency must be attached. **(10 Marks for one project, 10 for each additional project)**	20
	Sub Total:	**40**

3. Financial Soundness

Tendering Capability of an applicant will be taken as follows:

- The Audited Balance Sheets and Annual Turn Over for the last five years from Chartered Accountant firm must be submitted and should demonstrate the soundness of the applicant's financial position, showing long term profitability. Where necessary, the Employer will make inquiries with the applicant's bankers.
- Points shall be awarded under this category based on the following criteria:

Sr. No.	Description	Marks Assigned
a)	Audited Financial Statement of last five years and it must contain the UDIN # issued by the iCAP. If the turnover mentioned in the audit report is not reconciled with the annual tax returns submitted to FBR, then no marks shall be assigned in this category.	15
b)	Available Bank Credit line certificate (From concerned Bank) Max.: 300 million. a) 12.5 million (3 Marks) b) 25.0 million (6 Marks) c) 50.0 million (10 Marks)	10
Total Marks Allocated		**25**

4. Personnel Capabilities

- **Brief Discussion of Personnel Capabilities**

Personnel deputed on site will be evaluated on the basis of following points:

(Information regarding education qualification, total work experience and specific work experience is to be supported by documents such as copy of education qualification certificate / degree and CVs of concerned personnel proposed position, duly signed and, any other relevant documents).

Sr. No.	Description	Maximum Points
1.	Project Manager (B.E Civil registered with Pakistan Engineering Council with at least 10 Years Relevant Experience of buildings/ M.E Civil registered with Pakistan Engineering Council with at least 05 Years Relevant Experience of buildings) (05 Marks for each).	05
2.	Site Engineer (1 Nos.) (B.Sc./BE in Civil Eng. or B. Tech Civil technology with 05 Years relevant Experience **OR** Site Engineer (02 Nos.) D.A.E Civil with 10-12 years relevant experience of buildings.) (01 Marks for each)	03
3.	Electrical Engineer (1 Nos.) (B.Sc./BE or B. Tech Electrical with at least 08 Years Relevant Experience of buildings) (01 Marks for each)	01
4.	Lab Technician (1 Nos.) (DAE/BE Civil with at least 05 years relevant experience) (01 Marks for each)	01
5.	Quantity Surveyor (01 Nos.) (B.Sc./BE or D.A.E Civil with at least 05 to 08 Years Relevant Experience) (01 Marks for each)	01
6.	Surveyor/ Draftsman (2 Nos.) (D.A.E Civil with at least 05 to 08 Years Relevant Experience) (01 Marks for each)	02
7.	Civil Foreman/Supervisor (2 Nos.) (Intermediate with at least 10 Years relevant experience) (01 Marks for each)	02
	Sub Total:	**15**

* *Engineers with a B.E. degree for the above-mentioned positions must be affiliated with the company. Company manpower details will be verified online through the PEC portal, and the decision will be based on the information available in the company's online record.*
* *All the other staff must have their last six months' pay slip attached.*
* *All Safety measures will be the responsibility of Project Manager and Site Engineer.*

5. Equipment Capabilities

The applicant should own, or have assured access to (through rented, lease, purchase agreement or other means), the following key equipment (limited to only major items of equipment) in full working order, and must demonstrate that, based on known commitments, these will be available for deployment on the proposed contract or works. The applicant may also list alternative equipment which he would propose for

the contract together with an explanation of the alternate proposal.

Points will be given based on the following criteria:

Sr. No.	Description	Max. Points
1	Batching Plant (30 cubic meter per hour capacity) (01 Nos) (03 marks for each)	03
2	Concrete Pump (Stationary type) (01 Nos) (02 marks for each)	02
3	Excavator/Shovel/Loader/Tractor (01 Nos) (02 marks for each)	02
4	Concrete Transit Mixers (3-5 cubic meter capacity) (02 marks for each)	04
5	Semi-Automatic Mixture Machine (01 marks for each)	02
6	Form work (New marine-ply or steel formwork) (0.5 marks for each 10000 Sq-ft)	01
7	Scaffolding Pipes with all necessary accessories. (0.5 marks for each 15000 Rft)	01
8	Diesel Generator (65 kVA) (01 marks for each)	01
9	Concrete Vibrator (0.5 marks for each)	01
10	Plate Compactor (0.5 marks for each)	0.5
11	Rebar / Steel Cutting and Bending Machine (0.5 marks for each)	0.5
12	1 Total Station/Digital Theodolite (01 marks for each)	01
13	1 Level Machine/Dumpy Level (0.5 marks for each)	01
	Total Maximum Points	**20**

28.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26.

28.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:

(a) Making any correction for errors pursuant to Clause IB.27;

(b) Excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and

(c) Making an appropriate adjustment for any other acceptable variation or deviation.

28.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.

28.4 If the Bid of the successful bidder is seriously unbalanced in relation to the Employer's

estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price 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, the Employer may require that the amount of the Performance Security set forth in Clause IB.32 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

IB.29 Award

29.1 Subject to Clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to IB 29.2.

The Employer, at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in bidder's capacities, may require the bidders to provide information concerning their professional, technical, financial, legal or managerial competence.
Provided that such qualification shall only be laid down after recording reasons in writing. They shall form part of the records of that bid evaluation report.

IB.30 Employer's Right to Accept any Bid and to Reject any or all Bids

30.1 Notwithstanding Clause IB.29, the Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation except that the grounds for rejection of all bids shall upon request be communicated to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

IB.31 Notification of Award

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

31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted.

31.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.

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

IB.32 Performance Security

32.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Bidding Data Sheet and the Conditions of Contract within a period of 28 days after the receipt of Letter of Acceptance.

32.2 Failure of the successful bidder to comply with the requirements of IB.32.1 or IB.33 or IB.35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.33 Signing of Contract Agreement

33.1 Within 14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send the successful bidder the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.

33.2 The formal Agreement between the Employer and the successful bidder shall be executed within 14 days of the receipt of the Contract Agreement by the successful bidder from the Employer.

33.3 The formal Agreement between the Employer and the successful bidder shall be duly stamped at rate of 0.35% of bid price (updated from time to time) stated in Letter of Acceptance.

IB. 34 General Performance of the Bidders

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

IB.35 Integrity Pact

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

IB.36 Instructions not Part of Contract

Bids shall be prepared and submitted in accordance with these Instructions which are provided to assist bidders in preparing their bids, and do not constitute part of the Bid or the Contract Documents.

IB.37 Arbitration

Any dispute that is not amicably resolved shall be finally settled, unless otherwise specified in the Contract, under the Arbitration Act 1940 updated from time to time and would be held anywhere in the Province of Sindh at the discretion of procuring agency.

BIDDING DATA SHEET

BIDDING DATA

The following specific data for the Works to be bidder shall complement, amend, or supplement the provisions in the Instruction to Bidders. Wherever there is a conflict, the Provisions herein shall prevail over those in the Instructions to Bidders

Instructions to Bidders Clause Reference

Clause IB.1 Scope of Bid

Sub Clause 1.1 Name and address of the Employer:

The Employer is:
Sukkur IBA University
(Hereinafter Called the "Employer" Which expression shall include the successors, legal representatives and permitted assignees).

The Employer's Representative:

Project Director
Sukkur IBA University
Nisar Ahmed Siddiqui Road
Sukkur, Sindh
Pakistan

Name of the Project & Summary of the Works

The name of the Project is:

"CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR"

The Summary of the Works:

Sukkur IBA University intends to Construct ADMIN Block

The works comprise of RCC frame structure building works lying within the lines, boundaries and limits shown in the Drawings and any such additional areas adjacent thereto as may be designated by the Employer/Engineer from time to time for the construction to be Performed under the Contract. All such areas and additional areas shall be comprised within the Site of Works.

Clause IB.2 Source of Funds

Sub Clause 2.1

The Employer has received funding from School Education and Literacy Department, **Government of Sindh under ADP and has sufficient funds** to cover the Cost of the entire Project for which these Bidding Documents are issued.

Clause IB.3

Sub Clause 3.1

- Valid licensed by the Pakistan Engineering Council (PEC) in the category C-4 or above with specialized code, CE-09, CE-10(i), EE-11(vi).
- Valid Registered License from Electric Inspector for Electrical Works issued by Govt. of Sindh – (Sukkur Region). If the License is expired, copy of renewal challan to be attached.
- Bidder must have valid registration with Income Tax

and applicable Sales Tax along with Active Taxpayer Status.

- Bidders must have an average annual turnover as per (FBR tax returns) for the last five years that should be more than or equal to the estimated cost of the work.
- An affidavit (on non-judicial stamp paper) declaring that there is no litigation history, no blacklisting, and no involvement in any corrupt, fraudulent, or collusive practices. The affidavit shall also include an undertaking that all information and documents provided are true and correct. If, at any stage, the information is found to be bogus, fake, forged, or counterfeit, action shall be taken in accordance with the applicable rules.
- Affidavit on (non-judicial stamp paper) for Bidder must not have forfeited CDR/or bid security with the procurement agency Sukkur IBA University.

Clause IB.7 **Documents Comprising the Bid**

The Bidding Documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.

7.1.1 **Volume – I**

- Instruction to Bidders
- Bidding Data
- Form of Bid & Appendices to Bid
- Forms of Bid Security, Performance Security, Contract Agreement, Mobilization Advance against Bank Guarantee and Indemnity Bond for secured advance against Material Brought at Site.
- Part-I - General Conditions of Contract
- Part-II – Particular Conditions of Contract
- Special Provisions

7.1.2 **Volume-II**

- Technical Specifications for
    1. Civil Works
    2. Electrical Works
    3. Plumbing & Firefighting Works
    4. Health & Safety

7.1.3 **Volume-III**

- BOQ for
    1. Civil Works
    2. Electrical Works
    3. Plumbing & Firefighting Works

7.1.4 **Volume-IV**

- Drawings for
    1. Architectural Works
    2. Structural Works
    3. Electrical Works
    4. Plumbing & Firefighting Works

Clause IB.8	**Clarification of Bidding Documents**
Sub-Clause 8.1	Any prospective bidder requiring any clarification (s) in respect of Bidding Documents including any explanation/clarification of the items of works or their description as provided in the Invitation for Bids may notify the Employer's Representative in writing not later than fifteen (15) days prior to the date fixed for submission of bids. The Employer's'' response will be made not later than ten (10) days prior to the date fixed for submission of Bid.
Clause IB.10	**Language of Bid**
Sub-Clause 10.1	English
Clause IB 11	**Documents Accompanying the Bid**
Sub-Clause 11.1 (b)	Latest status of access to financial resources and commitments for the duration of Construction Period (including the current year).
Sub-Clause 11.3	The Bidder shall also submit along with the Bid the entire original document issued to him comprising Volume-I to Volume-II.
Clause IB.12	**Bid Price**
Sub-Clause 12.3	The Bidder shall obtain all information as to Pakistan Income Tax, Sales Tax, Company Taxes, Municipal Octrois, Levies and any other taxes imposed by the Government of Pakistan/Provincial Governments/local bodies, export and import duties and necessary permits and conform the requirements thereof at his own responsibility and include the same in his quoted unit rates and Bid Price. The quoted unit rates and Bid Price shall also include the cost of accepting the general risks/liabilities and obligations set forth or implied in the Contract. No claim at any later stage on this account will be entertained.
Sub-Clause 12.4	In line three (03) after the Word "Contract" delete the rest of the text of the Sub Clause.
Clause IB.13	**Currencies of Bid and Payment**
Sub-Clause 13.1	The unit rates and the prices shall be quoted by the Bidder entirely in Pakistani Rupee. All the payments to the Contractor for the works done shall be made in Pakistani Rupees. No foreign currency payment is admissible under this Contract.
Sub-Clause 13.2	The Sub-Clause is deleted in its entirety.
Clause IB.14	**Bid Validity**
Sub-Clause 14.1	Ninety (90) days
Clause IB.15	**Bid Security**
	The Bid Security shall be PKR 2.0 million.
Sub-Clause 15.2	in shape of Pay Order or Demand Draft" "or bid security issued by a scheduled bank". .
Clause IB.17	**Pre-Bid Meeting**
Sub-Clause 17.1	**Pre bid meeting time & Venue:** **NOT APPLICABLE**.
Clause IB.18	**Format and Signing of Bid**
Sub-Clause 18.5	One (01) copy of Power of Attorney must be attached to the Bid submitted to the

Employer if this Bid is signed / executed by a person other than the President, Partner or Owner of the Bidder's Company.

Clause IB.19 **Sealing and Marking of Bids**

Sub-Clause 19.1 ***Each Bidder shall submit his Bid through EPADS, Both Technical & Financial proposals shall be uploaded separately.*** Original Bid Security must reach at the office of project director on or before the date and time of opening of technical bid.

Sub-Clause 19.2 Employer's address for the purpose of Bid submission is as follows:

Project Director
Sukkur IBA University
Nisar Ahmed Siddiqui Road
Sukkur, Sindh
Pakistan

Name & identification number of the Contract is as follows:

Name: CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR

Clause IB.20 **Deadline for Submission of Bids**
Sub-Clause 20.1(a) **(as mentioned in NIT)**

Clause 23.1 **Bid Opening. (as mentioned in NIT)**

Sub-Clause 23.1 **Venue, time, and date of Bid opening:**
Project Director, Sukkur IBA University at 3:30 Pm

Evaluation and Comparison of Bids

Clause IB-28
Sub-Clause 28.1

In evaluating the Bids the Employer shall also examine whether the bid is balanced and the method of Performing the work Appendix-F and Proposed Construction Schedule Appendix-E submitted by the Bidder to confirm that all the requirements of staff to be deputed at site and Construction plant and equipment (Appendices -K &G) have been met without any deviation or reservations and that the proposed resources to be deputed by the Bidders' are adequate to Construct and Complete the Works in the proposed time period. Furthermore, the Contractors ability to mobilize and harness additional resources when required shall also be considered.

Conditional Bids shall be rejected notwithstanding the fact that those conditions are withdrawn by the Bidder subsequent to opening of the Bids.

Sub-Clause IB.29.2
Clause IB.30 **Employer's Right to Accept any Bid and to Reject any or all Bids**

Employer reserves the Right to Accept any Bid and to Reject any or all Bids as per PPRA Rule 33(1).

Sub-Clause 30.2. The Employer may withhold a reasonable amount in %age from the executed items to balance out the amount of lower/non workable items and the withheld amount will be released progressively in proportion to these items after execution.

Clause IB.31
Sub-Clause 31.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing ("Letter of Acceptance") that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in

consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Contract Price").

Sub-Clause 31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted, however, Employer may have clarification meetings to get clarify any item in the bid evaluation report.

Sub-Clause 31.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.

Sub-Clause 31.4 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their Bids have been unsuccessful and return their bid securities.

Clause IB.32 Performance Security

Sub-Clause 32.1

The successful Bidder shall furnish to the Employer a Performance Security in the form of an unconditional and irrevocable Bank Guarantee from a Schedule Bank in Pakistan in an amount of **5% (five percent)** of the Contract Price stated in the Letter of Acceptance in accordance with the Conditions of Contract within a period of twenty-eight (28) days after the receipt of Letter of Acceptance.

Clause IB 33 Signing of Contract Agreement

Sub-Clause 33.1

"The successful Bidder shall submit along with the Performance Security/Bond a draft copy of Agreement as per the Form of Agreement provided in the Bidding Documents, incorporating all agreements between the parties."

Sub-Clause 33.2

"The formal Agreement between the Employer and the successful Bidder shall be executed within twenty-eight (28) days of the receipt of Letter of Acceptance by the successful Bidder from the Employer but not before the submission by the Bidder and acceptance by the Employer of the Performance Security as per Sub-Clause 32.1 hereof."

Clause IB.37 Service at Site

Sub-Clause 37.1 It shall be the sole responsibility of the Contractor to provide, operate and maintain in working condition all temporary utilities and services such as water supply, Electricity, Telephone connections, sewerage disposal, etc. required for the proper execution of works under this Contract. Contractor shall also be responsible for payment of installations / re-installation /enhancement as well consumption charges, directly to the concerned agencies or any other charges or royalties levied by the concerned authority or local governing agency or any other municipal body. Bidder's attention is specially directed to sub-clause 15.3 of Special Provision attached to these Bid Document where by the successful bidder is required to make all necessary arrangements for a temporary electricity service, at site during the whole of the Construction period.

Clause IB.38 Contractor's Camp / Temporary Areas, Offices and Engineer's /Owner's Site Office

The Contractor shall make on his own, arrangements for his own camp, workshops,

yards, storage areas, offices, areas for erection of equipment and offices for the Engineer and the Employer closed to the site area and permissions, approvals required in this regard from the concerned agencies / authorities for all such facilities and costs thereof shall be the sole responsibility of the Contractor. P.S. labour residential camp will not be allowed inside the university campus.

Letters of Technical Bid/ Price Bid,
And
Appendices to Bid

LTB-1

Letter of Technical Bid

Date: .....

Bid Reference No: .....

(Name of Contract/Works)

To: .....

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (IB) 9;

(b) We offer to execute and complete in conformity with the Bidding Documents the following Works:

(c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of …… days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(d) As security for due performance of the under takings and obligations of our bid, we submit here with a Bid security, in the amount specified in Bidding Data Sheet, which is valid (at least) 28 days beyond validity of Bid itself.

(e) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process, other than alternative offers submitted in accordance with IB16 (as applicable).

(f) We agree to permit Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors. This permission is extended for verification of any information provided in our Technical Bid which comprises all documents enclosed herewith in accordance with IB.11.1 of the Bidding Data Sheet.

Name .....

In the capacity of.....

Signed .....

.....

Duly authorized to sign the Bid for and on behalf of.....

Date .....

.....

Address……..

LPB-1

Letter of Price Bid

Date: .....

Bid Reference No: .....

(Name of Contract/Works)

To: .....

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (IB)9;

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

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

(d) Our Bid shall be valid for a period of …….. days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(e) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;

(f) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed and we do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other bidder for the Works.

(g) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

(h) We agree to permit Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors. This permission is extended for verification of any information provided in our Technical Bid which comprises all documents enclosed herewith in accordance with IB.11.1 of the Bidding Data Sheet.

(i) If awarded the contract, the person named below shall act as Contractor's Representative.

Name .....

In the capacity of.....

Signed .....

Duly authorized to sign the Bid for and on behalf of.....

Date .....

Address……..

BA-1
Appendix-A to Bid

SPECIAL STIPULATIONS
Clause
Conditions of Contract

1.	Employer's name and address	1.1.2.2 & 1.3	Office of The Director Procurement, IBA Sukkur University Nisar Ahmed Siddiqui Rd, Delhi Muslim Housing Society, Sukkur, Sindh
2	Engineer's name and address	1.1.2.4 & 1.3	The project Director Sukkur IBA University
3.	Law applicable	5.1(b)	The law to be applied is the law of Islamic Republic of Pakistan
4.	Amount of Performance Security	10.1	5% of Contract Price stated in the Letter of Acceptance in the form of bank guarantee.
5	Time for Furnishing Program	14.1	Within 14 days from the date of receipt of Letter of Acceptance.
6.	Time for Commencement	41.1	Within 14 days from the date of receiptof Engineer's Notice to Commence which shall be issued within fourteen (14) days after signing of Contract Agreement.
7.	Time for Completion	43.1, 48.2	12 months from the date of receipt of Engineer's Notice to Commence.
	a) Amount of Liquidated Damages	47.1	Rs. 0.01% for each day of delay in completion of the works subject to a maximum of 10% of the Contract Price stated in Letter of Acceptance.
	b) Amount of Bonus	47.3	N/A
8.	Defects Liability Period	49.1	12 months (365 days) Days from the effective date of Taking Over Certificate.
9.	Percentage of Retention Money	60.3	5 % of the amount of Interim Payment Certificate.
10	Limit of Retention Money	60.3	10% of Contract Price stated in the Letter Of Acceptance. (5 % Performance Security and 5 % Security Deposit)
11.	Minimum amount of Interim Payment Certificate (Running Bills)	60.2	Rs. 10 million
12	Minimum amount of Running Account Bills	60.2	As per actual progress of work
13.	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer	60.10	30 days in case of local currency or 42 days in case of foreign funded projects.
14.	Mobilization Advance	60.12	10% of Contract Price as stated in the Letter of Acceptance. Mobilization advance shall be interest free and be based on bank guarantee.

BB-1
Appendix-B to Bid

FOREIGN CURRENCY REQUIREMENTS
(If required and only in case of International Bidding)

1. The Bidder may indicate here in below his requirements of foreign currency (if any), with reference to various inputs to the Works.

2. Foreign Currency Requirement as percentage of the Bid Price excluding Provisional Sums _____%.

3. Table of Exchange Rates

Unit of Currency	Equivalent in Pak. Rupees
Australian Dollar	----------
Euro	----------
Japanese Yen	----------
U.K. Pound	----------
U.S. Dollars	----------
----------	----------
----------	----------

BC-1
Appendix-C to Bid

COST ESCALATION-DIFFERENCE OF COST UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT

The source of prices and the weightages for use in the adjustment formula under clause 70 shall be as follows:

Cost Element	Description	Weightages	Applicable Price
1	2	3	4
(a)	Fixed Portion	0.30	
(b)	Local Labour (un-skilled labour per day shall be taken as representative of all types of Labour (skilled and un-skilled) of all trades)	0.10	Government of Pakistan, Pakistan Statistical Bulletin
(c)	Cement – in bags	0.15	Government of Pakistan, Pakistan Statistical Bulletin
(d)	Reinforcing Steel – per Ton Grade-60 Grade-40	0.20	Government of Pakistan, Pakistan Statistical Bulletin
(e)	Bricks	0.10	Government of Pakistan, Pakistan Statistical Bulletin
(f)	High Speed Diesel (HSD)	0.15	Pakistan State Oil (PSO)
	Total	1.00	

Not Applicable

Notes:

1) Price for "(b) (c) (d) and (e)" shall be taken from the Government of Pakistan, Pakistan Statistical Bulletin and price for (f) shall be as announced by Pakistan State Oil (PSO). The base prices shall be fixed and current prices shall be those applying 28 days prior to the **last day of the monthly statement period**.

2) The Price for the cost element of "(b) (c) (d) and (e)" shall be used for the City where the Site is located. In-case the Site is not listed in the monthly Pakistan Statistical Bulletin, the prices for the nearest City listed in the Bulletin shall be used.

3) Any fluctuation in the prices of materials other than those given above shall not be subject to adjustment of the Contract Price and shall be deemed to be included in the rates and prices quoted by the Bidders.

4) The weightage is calculated on the basis of estimated quantities and cost. In the initial stage of execution, the price adjustment will be made on the basis of weightage given in above table. However the final price adjustment will be paid on the basis of weightage worked out on quantities and cost at completion of work.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

Appendix-D to Bid

BILL OF QUANTITIES

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Conditions of Contract, 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 executed and measured by the Contractor and verified by the Engineer and valued at the rates and prices entered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix in accordance with provisions of the Contract.

3. The rates and prices entered in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract include all costs of Contractor's plant, labour , supervision, materials, execution, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract. Furthermore all duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to deadline for submission of Bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.

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 will have 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 the Works.

6. General directions and description of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Bidding Documents 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-Clause 58.2 of Part I, General Conditions of Contract.

CONSTRUCION OF ADMIN BLOCK
IBA PUBLIC SCHOOL SUKKUR

BILL OF QUANTITIES

CLIENT
SUKKUR IBA UNIVERSITY

CONSULTANT
NBK CONSULTANTS
CONSULTING ENGINEERS, ARCHITECTS & PLANNERS

ENGINEERS ESTIMATE FOR				
CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR				
COST SUMMARY				
S#	**DESCRIPTION**	**SCHEDULE ITEM**	**NON-SCHEDULE ITEM**	**TOTAL AMOUNT**
1	Civil Works			
2	Public Health Works			
3	Electrical Works			
4	Solar			
5	**Total=**			
6	**Grand Total=**			
In Words				

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

ABSTRACT OF COST(Civil Work)

REF. NO. CSR 2024	ITEM NO	DESCRIPTION	Unit	Quantity	Rate (CSR 2024)	Amount
PART-I SCHEDULED ITEM						
Part-1 C-1 Item#18 (b) P-17	**1.1**	**Earth Work**				
		Excavation in foundation of Building Bridges and other structures including dag belling dressing, refilling around structure with excavated earth Watering and ramming lead up to 5ft., lead up to one chain (30metre) and lift up to 5 ft. (1.5 meter). **Footing and allied works**	P.Cft	36803.41	11.88	437,224.51
Part-1 C-1 Item#21 (b) P-17	**1.2**	**Backfilling**				
		Filling, watering and ramming earth in floor with surplus earth from foundation lead up to the one chain and lift up to 5 ft. **Same excavated material**	P.Cft	21923.41	6.50	142,502.17
Part-1 C-5 Item#29 P-34	**1.3**	Supplying and filling sand under floor and plugging in walls (where required including laying levelling dressing complete) **Sand Filling**	P.Cft	16000.00	57.52	920,320.00
Part-1 C-1 Item#13 (b)ii) P-16	**1.4**	Earth work compaction (Soft ordinary or hard soil)(b) Laying earth in 6 layers levelling and dressing and watering for compaction etc. complete. **Compaction**	P.Cft	33073.41	1.92	63,500.95
Part-1 C-7 Item#38 P-43	**1.5**	Proving and laying single layer of polythene sheet 0.13mm thick for water proofing as per specifications and instructions of engineer in charge **Polythene sheet for Flooring and allied Works**	P.Sft	4720.69	24.01	113,343.65
SECTION-2 PLAIN AND REINFORCED CONCRETE						
Part-1	**2.1**	**Plain Concrete**				

C-4 Item # 5 (i) P-25		Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate without shuttering). (a) Ratio 1:4:8 **Footing Lean** **Under flooring**	P.Cft	3691.63	348.83	1,287,751.26
Part-1 C-4 Item # 5 (h) P-25	**2.2**	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate without shuttering). Ratio (1: 3:6) **Flooring**	P.Cft	1458.60	388.67	566,914.06
C-4 Item #19-b P-27	**2.3**	Erection and removal of centering for R.C.C or plain concrete works of Partal wood vertical **Allied Works**	P.Sft	1100.00	106.48	117,128.00
Part-1 C-4 Item # 6 a(i) P-25	**2.4**	**R.C.C**				
		Reinforced cement concrete work including all labour and material except the cost of steel reinforcement and its labour for bending and binding which will be paid separately. This rate also includes all kinds of forms moulds, lifting, centering, shuttering and curing.(including screening and washing of shingle.) R.C.C work in roof slab, beams, column, rafts, lintel sand other structural members laid in situ or precast laid in position complete in all respects. **Footing** **Plinth Beam** **Beams** **Slab** **Stair**				
		Ratio 1:2:4 90 Lbs. of cement, 2 Cft sand and 4 Cft shingle 1/8" to 3/4" gauge.	P.Cft	18047.07	717.59	12,950,393.37

Part-1 C-4 Item # 6 a(ii) P-25	**2.5**	Reinforced cement concrete work including all labour and material except the cost of steel reinforcement and its labour for bending and binding which will be paid separately. This rate also includes all kinds of forms moulds: lifting shuttering and curing (including screening and washing of shingle.) R.C.C work in roof slab, beams, column, rafts, lintels and other structural members laid in situ or precast laid in position complete in all respects. **Columns**				
		(II) Ratio 1:1-1/2:3 90Lbs of cement,1-1/2 Cft sand and 4 Cft shingle 1/8"to3/4"gauge.	Cft	3366.75	787.71	2,652,022.64
C-4 Item # 2 ,P-24	**2.6**	Dry rammed brick or stone ballast 1 1/2" to 2" gauge. **Stone Ballast under footing**	P.Cft	1567.30	104.97	164,519.22
SECTION-3 Reinforcement Work						
Part-1 C-5 Item # 8a (i) P-26		**Steel**				
	3.1	Fabrication of deformed steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.				
	3.2	Deformed Bar Grade -60	P.Cwt	847.045	18934.02	16,037,969.67
SECTION-4 Brick Masonry Work						
C-5 Item #4 e, P-29	**4.1**	Pacca Brick Work in foundation and plinth in: e) Cement Sand Mortar 1:6 **Under Plinth level/ For Situ** **9''-00 Thick**	P.Cft	3867.960	359.20	1,389,371.23
C-5 Item #5 e, P-30	**4.2**	Pacca brick work in ground floor in (e) Cement sand mortar. 1:6 **9''-00 Thick** **4-1/2'' Thick**	P.Cft	4189.560	381.18	1,596,976.48
C-5 Item #5 e, P-30 + Item#6 , p-30	**4.3**	Pacca brick work in first floor in (e) Cement sand mortar. 1:6 **9''-00 Thick** **4-1/2'' Thick**	P.Cft	3790.565	398.41	1,510,199.00

C-5 Item #5 e, P-30 + Item#6 , p-30	**4.4**	Pacca brick work in Roof in (e) Cement sand mortar. 1:6 **9''-00 Thick or 4-1/2'' Thick**	P.Cft	1821.750	420.29	765,663.31
SECTION-5 Surface Rendering						
C-9 Item #11 (c) P-52	**5.1**	Cement plaster 1:4 up to 12' height (c) 3/4" thick (For Internal Side)				
		Ground Floor	P.Sft	13902.090	53.82	748,210.48
	5.2	First Floor	P.Sft	10967.010	53.82	590,244.48
	5.3	Roof (Add 13% extra labour rate)	P.Sft	3071.500	58.60	179,989.90
C-9 Item #11 (a) P-52	**5.4**	Cement plaster 1:4 up to 12' height (c) 1/2" thick (For Ceiling)				
		Ground Floor	P.Sft	4291.585	39.83	170,933.83
	5.5	First Floor	P.Sft	4433.580	39.83	176,589.49
	5.6	Roof (Add 13% extra labour rate)	P.Sft	497.500	43.58	21,681.05
C-9 Item #11 (c) P-52	**5.7**	Cement plaster 1:4 up to 12' height (c) 3/4" thick (For External)				
		Ground Floor	P.Sft	1000.000	53.82	53,820.00
	5.8	First Floor	P.Sft	1000.000	53.82	53,820.00
	5.9	Roof (Add 13% extra labour rate)	P.Sft	1000.000	58.60	58,600.00
C-9 Item#35 p-54	**5.11**	Extra labour rate for making cement plaster pattas/band around straight or carved openings and around the edges of roof slabs, the width not less than 6" with fine finishing as directed by Engineer In charge. **Far Facade Design**	Per Rft	3000.000	57.43	172,290.00
SECTION-6 Roofing & Water Proofing						
C-11 Item #9, P-63	**6.1**	Bitumen coating to plastered or cement concrete surface. **For All CC or RCC under Plinth construction**	P.Sft	5524.480	21.83	120,599.40
C-4 item #14 , P-26	**6.2**	Reinforced cement concrete spout including fixing in position 24" x 16" x 2.5"	Each	10.000	2446.26	24,462.60
SECTION-7 Painting & Varnishing						

C-9 Item,#36 a P-54 & 36 B P-54	**7.1**	Preparing the surface and painting with matt finish i/c rubbing the surface with bathy (Silicon carbide rubbing brick) filling the voids with zinc/chalk/plaster of Paris mixture, applying first coat premix making the surface smooth and then painting 3 coats with matt finish of approved make etc: complete (3 coats) **Ground Floor** **First Floor**	P.Sft	26611.725	100.83	2,683,260.23
C-9 Item#23 P-53	**7.2**	Primary coat of Chalk under distemper (for ceiling) **Ground Floor** **First Floor** **Roof**	P.Sft	8725.165	3.59	31,323.34
C-9 Item#24 c P-53	**7.3**	Distempering (c) three coats.(for ceiling) **Ground Floor** **First Floor** **Roof**	P.Sft	8725.165	17.23	150,334.59
C-9 Item#38 A & B P-54	**7.4**	Preparing the surface and painting with weather coat I/c rubbing the surface with rubbing brick / sand Paper, filling the voids with chalk/ plaster of Paris and then painting with weather coat of approved make. (3 Coats) **Facade** **Roof** **Internal Side of Block i/c corridor columns etc.**	P.Sft	6211.000	86.58	537,748.38
C-11 Item#5d . P-63	**7.5**	Painting new surfaces:-(d) Preparing surface and painting guard bars,gates of iron bars, gratings, railings (includingstandards braces, etc.). And similar open work.				
		i) Priming Coat	P.Sft	500.000	9.76	4,880.00
		ii) Each subsequent coat of paint	P.Sft	500.000	7.12	3,560.00
SECTION-8 Floor finishes						

C-8 Item #25 P-45	**8.1**	Laying floors of approved colored glazed tiles 1/4" thick floor of approved color & size jointing in white cement and laid over 1:2 cement sand mortar 3/4" thick including grouting with matching color and finishing. **Washrooms ground Floor First floor**	P.Sft	781.750	325.40	254,381.45
C-8 Item #38 P-47	**8.2**	Laying floor of approved with glazed tiles 1/4" thick dado of approved color & size jointing in white cement and laid over 1:2 cement sand mortar 3/4" thick including grouting with matching color and finishing **Washrooms ground Floor First floor**	P.Sft	3902.500	389.36	1,519,477.40
C-8 Item #28(vii) ix P-46	**8.3**	Providing & Laying Full Body Porcelain Tile in Flooring or Facing of Approved Design Set in Grey Cement Motor 1:2 or of 3/4" Thickness I/C Washing & Joints With White Cement Slurry Using Colour Pigment for matching complete as per Specification. 24"x24"x5/16" **Ground Floor Tiles First Floor Tiles (Also for Skirting)**	P.Sft	9201.702	439.57	4,044,792.06
SECTION-9 Carpentry and Joinery						
C-10 Item # 9 P-57 &- Item #25 P-58	**9.1**	Providing and fixing in position doors, windows and ventilators of first class deodar wood frames and 1-3/4" thick commercial ply veneer shutters of first class deodar Skelton (solid door)and commercial plywood (3 ply) on both sides including holdfasts hinges iron tower bolts handles and cleats with cord and one mortice lock and hooks.(deduction of Chowkhat price 2998.14- 1233.27=1764.87)	P.SFt	1323.000	1764.87	2,334,923.01

C-17 Item#29 P-76	**9.2**	Providing and fixing G.I frames /Chowkhat of size 7" x 2" or 4 1/2" x 3" for door using (16) gauge G.I sheet I/c welded hinges and fixing at site with necessary hold fasts, filling with cement sand slurry of ratio 1:6 and repairing the jambs. The cost also i/c all carriage, tools and plants used in making and fixing. **Ground Floor First Floor Roof**	P.SFt	1040.000	690.67	718,296.80
C-18 item #84b P-83	**9.3**	Supplying & fixing in position Aluminum channels framing for sliding windows & ventilators of Alcop made with 5 mm thick tinted glass glazing (Belgium) & Aluminum fly screen I/c handles stoppers & locking arrangement etc. complete. (b) Deluxe model (Bronze). **Ground Floor First Floor**	P.SFt	1487.500	2386.73	3,550,260.88
SECTION-10 Metal Work						
C-7 item #43 P-43	**10**	**False Ceiling** Providing & fixing false ceiling of thermopile in panels of required design and size including frame work of aluminum T-section hanged with nail wire to ceiling etc: Completed.	P.Sft	4608.455	216.75	998,882.62
SECTION-11 Façade						
C-18 Item #103 P-86	**11.1**	Providing and fixing Ghutka Brick facing 2 1/2"x 9" x2 1/4" size of approved design set in cement mortar 1:3 i/c filling the joints with white cement slurry colour pigment for matching i/c levelling smooth finishing, curing and scaffolding etc. complete as per specification and directed by the Engineer / In charge **Ground Floor First Floor Roof/Parapet**	P.Sft	9919.000	531.28	5,269,766.32
C#4 Item #11 (ii) /P-26	**11.2**	**ORNAMENTAL JALI** Providing & Fixing ornamental cement jali 4" thick 1:2:4 without steel	P.Sft	200.000	452.24	90,448.00

SECTION-12 Miscellaneous						
C-18 Item #92A P-84	**12.1**	Providing Anti -termite treatment by spraying /sprinkling /spreading Neptachlar 0.5% Emulsion as an overall pre - construction treatment in slab type construction under the slab and along attached perches or entrances etc, complete as per directions of Engineer In charge.	P.Sft	7800.000	11.46	89,388.00
Part-1 C-7 Item # 41 (b) P-43	**12.2**	**DPC**				
		Providing and fixing bitumen felt paper of 60 Lbs. over roof including cleaning of roof with wire brush and removing dust, applying bitumen coat at the rate of 34 Lbs. per Sft as premix inter coats and then laying felt paper with 10% overlaps, then applying and spreading hill sand at the rate of 1 Cft for 100 Sft. The cost also includes necessary for material, kerosene oil, wood etc.	P. Sft	519	95.62	49,592.36
C#8 Item #69 / P-50	**12.3**	***Paving Blocks***				
		Providing & fixing cement paving blocks flooring having size of 197 x 97 x 60 (mm) of city /quaddra / cobble shape with natural colors , having strength b/w 5000 PSI to 8500 PSI i/c filling the joints with hill sand over a bed of 2" thick hill sand or stone dust and laying and compacting in specified manner/ pattern and design etc. complete	P.Sft	2434	197.48	480,666.32
C#8 Item # 28 (v)b / P #46	**12.5**	**Counter top Marble** Laying Super Botisina, Crème, Badal or Black Marble 12"x12"/12"x24" fine dressed on the surface without winding set in lime mortar1:2 including rubbing and polishing of the joints. (b) 1" Thick Marble (for countertop+Stair Steps and related work)	P.Sft	742	378.19	280,711.53
		Total Amount for Schedule Item (Rs)				**66,179,734.04**
		Total Amount Schedule Item (M)				**66.18**
Amount Premium Quoted by Contractor Above/Below +/..... % (B)						
TOTAL COST OF SCHEDULE ITEMS						

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR					
ABSTRACT OF COST(Civil work)					
S#	**DESCRIPTION**	**Unit**	**Quantity**	**Rate (non-Schedule)**	**Amount**
PART-II NON-SCHEDULED ITEM					
1	**Tempered Glass**				
	Supply and fix, 12mm thick tempered Glass (Ghani/Tariq float or equivalent) door in any size including all necessary accessories i.e. pivot machine, S.S handle, D lock etc. as specified & as per instruction of engineer in charge complete in all respect	P.Sft	176.00		
2	**Roof Treatment**				
	P/L Water proofing treatment on roof slabs comprising of 3"thick avg. 1:3:6 screed/Concrete over a roof grip membrane of roof Grip 4mm thick with hot bitumen coat, followed by concrete 1:2:4 consist of 2" avg. thick in panels spaced at 4ft interval with Chicken Mesh Jali, and strips 0.5"gap filled with hot bitumen pb4 to ensure water proofing, I/c proper leveling, curing and trowel finish to comply with approved specification and instruction of Engineer i/c gola complete in all respects and as approved by the Engineer In charge.	P.Sft	4,480.00		
3	**Plinth Protection**				

	Providing and laying of 3" thick 1:2:4 CC topping divided into panels with Glass/Marble strips, Compaction, watering, ramming of Sweet Earth fill below PCC (inside Plinth Protection)	P.Sft	1,020.00		
4	**Iron Grill for Windows**				
	Supplying & fixing in position iron/steel grill of 1/2"x1/2" size flat iron of approved design and dimension for Aluminum windows as per directions of Engineer/ Incharge complete in all respect i/c color	P.Sft	1,487.50		
5	**False ceiling**				
	CMC lay-in ceiling comprising of Aluminum perforated tiles size 600x600x0.8 mm lay-in panels chromate and stove enameled in white powder coated finish and " thick standard canceled gypsum board borders ceiling as per your drawings. The tiles shall be perforated with 1.8 mm holes. The units shall be provided with factory applied high sound absorption non-combustible fire-resistant acoustic membrane in black color complete with exposed grid extruded aluminum suspension system in black anodized finish consisting of main tees, cross tees perimeter trim and adjustable galvanized steel hanger and galvanized steel suspension system for gypsum board ceiling including painting and provsion of light fixtures Providing and fixing 1200mm x300mm aluminum strip ceiling by CMC including all suspension system as per drawing and approved by Architect/Engineer	P.Sft	636.75		
6	**Ledge** Providing and fixing with 12-SWG (3"') Iron Angle to the ledge with proper fixing and complete in all respect i/c labour and all related work for fixing the angle iron to the ledge and proper fixing of Gutka (Gutka will be paid seperately)	Rft	1,026.00		

7	Providing and fixing M.S. pipe corridor railing, comprising, vertical posts of 1-1/2" x 1-1/2" M.S Square tube @ 3' c/c , 3/4" x 3/4" 2 no's 16 SWG horizontal bracing Wooden Handrail at top as per design including cost of specials, bends, threading, cutting and making good damages on the floor or wall of any kind etc. at any floor. complete as per instruction of the Engineer-in-Charge.(Taiwan or Equivalent)	RFT	186.000		
8	O.H.W.T(RCC Over Head Tank) Complete in all respects as per drawing /directions of Engineer In charge.	GLN	2500.000		
	Total Amount for Schedule Item (Rs)				
	Total Amount for Schedule Item (M)				

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

ABSTRACT OF COST (Plumbing Works)

REF. NO. CSR 2024	ITEM NO	DESCRIPTION	Unit	Quantity	Rate CSR 2024	Amount
SECTION-1 SANITARY FIXTURES AND FITTINGS						
V-III Part-III C#1 Item # / P-189	1	Providing & fixing in position nylon connection complete with 1/2" dia. brass stop cock with pair of brass nuts and lining joints to nylon connection.	Each	20	637.65	12753

V-III Part-III C#6 Item # / P-199	2	Providing & fixing C.P Muslim shower with double bib cock & ring pipe.	Each	16	5475.6	87609.6
C#1 Item #2A(ii) / Page # 184	3	Providing and fixing squatting type white glazed earthen ware W.C. pan with front flush inlet & complete with including the cost of flushing cistern with internal fitting and flush pipe with bend and making requisite number of holes in walls, plinth & floor for pipe connection & making good in cement concrete 1:2:4. (Foreign Quality)(23 inch) earthen ware trap and plastic thumble.	P.No	10	13655.06	136550.6
C#1 Item #4 / P-186	4	Providing and fixing European type white glazed earthen ware wash down W.C. pan complete with & including the cost of white / black plastic seat (Best quality) and lid with C.P. brass hinges best quality and buffers 3 gallons white glazed earthen ware low level flushing cistem with siphon fitting 1½ " dia white porcelain enameled flush bend dia and making requisite number of holes in walls , plinth & floor for pipe connection & making good in cement concrete 1:2:4 (Foreign quality) . (ICL or equivalent).	P.No	6	42354.59	254127.54
C#1 Item #10/ P-187 + Item #11 / P-187	5	Providing and fixing 24"x18" lavatory basin with Pedestal in white glazed earthen ware complete with & including the cost of W.I. or C.I. cantilever bracket 6 inches built into wall, painted white in two coats after a primary coat of red lead paint, a pair of 1- 1/2" dia. chrome plated pillar taps, 1-1/2" rubber plug & chrome plated brass chain 1-1/4" dia malleable iron or C.P. brass traps malleable iron or brass unions and making requisite number of holes in walls, plinth & floor for pipe connection &	P.No	10	27770.05	277700.5

		making good in cement concrete 1:2:4 (Foreign Equivalent).				
C#1 Item #10/ P-187	6	Providing and fixing 24"x18" lavatory basin without Pedestal in white glazed earthen ware complete with & including the cost of W.I. or C.I. cantilever bracket 6 inches built into wall, painted white in two coats after a primary coat of red lead paint, a pair of 1- 1/2" dia. chrome plated pillar taps, 1-1/2" rubber plug & chrome plated brass chain 1-1/4" dia malleable iron or C.P. brass traps malleable iron or brass unions and making requisite number of holes in walls, plinth & floor for pipe connection & making good in cement concrete 1:2:4 (Foreign Equivalent).	Each	6	24094.98	144569.88
V-III C-1 Item #19c P-188	7	Providing and fixing steel sinks stainless local bt make complete with cast iron or wrought iron LINA ALVH brackets 6 inches built into wall, 1- 1/2" rubber plug and chrome plated brass chain 1- 1/2" C.P. brass waste wvith 1-1/2" P.V.C. waste pipe & making requisite number of holes in walls, plinth & floor for pipe connection & making good in cement concrete 1:2:4. a Steel Sink stainless size 33"x18" local make (standard pattern)	P.No	2	10215.27	20430.54
V-III C-2 Item #3(b) P-190	8	Providing and fixing 15" x 12" beveled edge mirror of Belgium glass complete with 1/8" thick hard board and C.P screws fixed to wooden pleat (b) Superior Quality	Each	6	3510	21060

V-III C-2 Item #1(b) P-190	9	Providing & fixing chrome plated brass towel rail complete with brackets fixing on wooden cleats with 1" long c.p brass screws. (I) Towel rail 36" long (b) 3/4" dia. round or square (Superior quality).	Each	3	3285.07	9855.21
Item #2(b) P-190	10	Providing and fixing C.P. brass toilet paper brackets complete (similar) to twyford design number 1108 superior quality.	Each	6.00	1,170.00	7,020
Item #5 P-190	11	Supplying & fixing soap tray of superior quality and design with fine finishing with C.P. screws etc. complete.	Each	12.00	585.00	7,020
C#1 Item #20/ P#189	12	FLOOR TRAP Providing and fixing 6" x 2" or 6" x 3" C.I floor trap of the approved self-cleaning design with a C.I screwed down grating with or without a vent arm complete with and I/c making requisite number of holes in walls, plinth & floor for pipe connections & making good in cement concrete 1:2:4.	P.No	40	1647.07	65882.8
C#6 Item #14-a / P#198	13	Supplying & fixing wash basin mixture of superior quality with C.P. head1/2" dia. 1/2" dia.	Each	16	3135.6	50169.6
C#6 Item #17 / P#199	14	Supplying & Fixing sink mixture of superior quality with C.P head 1/2" dia.	Each	2	2550.6	5101.2
C#6 Item #14-b / P#199	15	S/fixing concealed Tee-stop cock of superior quality with C.P. head 1/2" dia. 1/2" dia.	Each	20	1614.6	32292

C#1 Item#7 / Page # 187	16	URINAL Providing and fixing flat black lipped from urinal basin (of not less than 17" in height) of white glazed earthen ware complete with & including the cost of 1 gallon C.I, automatic flushing cistern with fittings, a pot cock C.I. or W.I. brackets standard flush pipe with fitting standard waste pipe (enameled iron) connection complete and making requisite number of holes in walls, plinth & floor for pipe connection & making good in cement concrete 1:2:4.(Foreign or equivalent)	Each	1	4815.14	4815.14
C# 6 Item # 13-b / Page #198	17	CP BIB COCK ½" Dia S/Fixing long bib-cock of crystal head with ½" dia.	Each	10	2784.6	27846
SECTION -2 SOIL, WASTE AND VENT PIPES						
C#2 Item#6 / P-112	18	Providing, Laying uPVC pipes of Class-'D' fixing in trench i/c cutting ,fitting and jointing with solvent cement i/c Testing with water to ahead of 122 meter or 400 ft. (i/c All Fittings Complete in all respect)				
	19	c) 50 mm (2" dia.)	P.Rft	137	272.46	37327.02
	20	e) 80 mm (3" dia.)	P.Rft	349	405.35	141467.15
V-III C-Item #2 (v)/P-193	21	Providing UPVC. pipes specials and clamps etc. including fixing cutting and fittings complete with and including the cost of breaking through walls and roof making good etc. with pigment to match the colour of the building and testing with water to a pressure bead of 200 feet and handling. 4" dia. SDR series (i/c All Fittings Complete in all respect)	Rft	440.00	465.53	204,833

V-III C-Item #2 (vi)/P-193	22	Providing UPVC. pipes specials and clamps etc. including fixing cutting and fittings complete with and including the cost of breaking through walls and roof making good etc. with pigment to match the colour of the building and testing with water to a pressure bead of 200 feet and 6 inches dia. uPvc pipe (i/c All fittings complete in all respect)	Rft	506.00	950.38	480,892
SECTION-3 WATER SUPPLY PIPES AND FITTINGS						
C#2 Item#E (1) /P #114	23	Providing, Laying & Fixing in trench (Walls) i/c fitting, jointing & testing etc. complete in all respect the high Density Polyethylene PE pipes (HDPE-100) for W/S confirming ISO 4427/DIN8074/8075 B.S 3580 & PSI 3051 PN 10 (i/c All fittings complete in all respect)				
	24	(a) 25mm dia.	P.Rft	516	57.99	29922.84
	25	(b) 32 mm	P.Rft	376	70.59	26541.84
	26	c) 40mm dia.	P.Rft	120	98.54	11824.8
	27	d) 50mm dia.	P.Rft	200	144.07	28814
	28	d) 75mm dia.	P.Rft	150	287.8	43170
	29	d) 90mm dia.	P.Rft	100	402.72	40272
C#6 Item 6 / P#198	30	**Providing and Fixing ball valves (China)**				
	31	a 1/2" dia.	Each	10	1029.6	10296
	32	b 3/4" dia.	Each	10	1146.6	11466
	33	c 1" dia.	Each	10	1322.1	13221
	34	d 1-1/4" dia.	Each	10	1380.6	13806
	35	e 1-1/2" dia.	Each	6	1439.1	8634.6
	36	d 2" dia.	Each	5	1614.6	8073
SECTION -4 MISCELLENEOUS						
C#10 Item# 1 / P#198	37	Supplying & fixing 6" x 4" earthen gully trap with 4" outlet complete with 4" thick 1:2:4 C.C for bed & 1/2 thick cement plaster (1:3) to the Kerb C.I grating 6" x 6" and C.I. cover and frame 12"x12" (inside) etc Complete (b) earthen ware glazed gully trap(a) (i) 6'x6"x4" (i) With C.I Cover and Frame	Each	13	3276	42,588

C#2 Item# O-a / P#134	38	Constructing manhole or inspection chamber for the required diameter of circular sewer and 3'-6"(1067mm) depth with walls of B.B in cement sand mortar 1:3 cement plastered 1:3,1/2" thick inside of walls and 1" (25mm) thick over benching and channel i/c fixing C.I manhole Cover with Frame of Clear opening 1-1/2' x 1-1/2' (457x457 mm) of 1.75 cwt (88.9) embedded in plain C.C 1:2:4 and fixing 1" (25mm) dia. M.S Steps 6' (150 mm) Wide Projecting 4" (102mm) from the face of wall at 12" (305 mm) C/C duly Painted Etc. Complete as per standard Specification and Drawing. (a) 4" to 12" dia 2'x2'x3'-6"	Each	10	55584.18	555,842
TOTAL SCHEDULE ITEMS			2873795.14			
10% Below As per Notification No.D.S/1385 Dated 24-10-2024			**287,380**			
TOTAL COST OF SCHEDULE ITEMS			**2,586,416**			
Amount Premium Quoted by Contractor Above/Below +/ ..... % (B)						
TOTAL COST OF SCHEDULE ITEMS						

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

ABSTRACT OF COST (Plumbing Works)

S#	DESCRIPTION	Unit	Quantity	Rate (Non Schedule)	Amount
PART-II NON-SCHEDULED ITEM					
1	Clean Outs (Qabil) 6"x6"	No.	28		
	Grand Total Amount Non-Schedule Item (Rs)				
	Grand Total Amount Non-Schedule Item (M)				

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR

Electrical work

BASED ON SINDH SCHEDULE RATES OF 2024.

S-NO	DESCRIPTION OF WORK	UNIT	QTY	RATE	AMOUNT
	Wiring:-				
102 / P-236	Wiring for light or fan point with (3/.029) PVC insulated wire in 20mm (3/4") dia. PVC conduit recessed in the wall or column as required.				
	Ground Floor	Point	220	6,573.50	1,446,170
	First Floor	Point	220	6,573.50	1,446,170
	Roof	Point	20	6,573.50	131,470
104 / P-236	Wiring for plug point (3/.029) PVC insulated wire in 20mm (3/4") dia PVC conduit recessed in the wall or column as required				
	Ground Floor	Point	40	4,372.29	174,892
	First Floor	Point	40	4,372.29	174,892
	Roof	Point	10	4,372.29	43,723
24 / P-230	Providing & laying (Main or Sub Main) PVC insulated with size 2-7/.029 copper conductor in ¾" Dia PVC conduit recessed in the wall or column as required (For PP & Circuit Wiring)				
	Ground Floor	P.Rft	800	684.64	547,712
	First Floor	P.Rft	800	684.64	547,712
	Roof	P.Rft	200	684.64	136,928
11 / P-229	Providing & laying (Main or Sub Main) PVC insulated with size 2-7/.036 copper conductor in ¾" Dia PVC conduit recessed in the wall or column as required.				
	Ground Floor	P.Rft	500	506.75	253,375
	First Floor	P.Rft	500	506.75	253,375
12 / P-229	Providing & laying (Main or Sub Main) PVC insulated with size 2-7/.044 copper conductor in ¾" Dia PVC conduit recessed in the wall or column as required. (For AC Wiring)				
	Ground Floor	P.Rft	900	660.91	594,819
	First Floor	P.Rft	900	660.91	594,819

	Accessories:-				
189 / P-244	Providing & fixing two pin SP 10/15amp plug & socket				
	Ground Floor	P.No.	45	468.19	21,069
	First Floor	P.No.	45	468.19	21,069
190 / P-244	Providing and fixing three pin 10/15 amp plug/socket flush type				
	Ground Floor	P.No.	20	677.36	13,547
	First Floor	P.No.	20	677.36	13,547
191 / P-244	Providing and fixing bakelite / Plastic ceiling rose with two terminals				
	Ground Floor	P.No	50	373.39	18,670
	First Floor	P.No	50	373.39	18,670
195 / P-244	Providing & fixing A.C Electric Ceiling fan 56" (good quality)				
	Ground Floor	P.No	15	14869.21	223,038
	First Floor	P.No	16	14869.21	237,907
	Circuit breakers:-				
178 / P-243	Providing & fixing circuit breaker 6, 10, 15, 20, 30, 40, 50, 63a SP (TB-5S) on prepared box as required.				
	Ground Floor	Each	32	2,504.12	80,132
	First Floor	Each	32	2,504.12	80,132
179 / P-243	Providing & fixing circuit breaker 6, 10, 15, 20, 30, 40, 50 & 63a DP (TB-5S)on prepared board as reuqired (For AC & FF DB-1 & 2)				
	Ground Floor	Each	12	5,528.57	66,343
	First Floor	Each	12	5,528.57	66,343
181 / P-243	Providing & fixing circuit breaker 15,20,30 , 40, 50 & 60amp TP(XE-100cs[CB]) on prepared board as required				
	Ground Floor	Each	5	26,103.18	130,516
	First Floor	Each	5	26,103.18	130,516
183 / P-243	Providing & fixing circuit breaker 60 to 100A TP TP (XS-100NS) on prepared box as required.				
	Ground Floor	Each	1	28,736.16	28,736

	First Floor	Each	1	28,736.16	28,736
	DB'S Wiring:-				
80 / P-234	Providing & laying (MAIN or SUB MAIN) PVC insulated & PVC sheathed with 4 core copper conductor 600/1000 volts size 16mm²				
	Ground Floor (From Main DB to GF DB-2)	P.Rft	50	1937.18	96,859
	First Floor (From Main DB to FF DB-2)	P.Rft	100	1937.18	193,718
81 / P-234	Providing & laying (MAIN or SUB MAIN) PVC insulated & PVC sheathed with 4 core copper conductor 600/1000 volts size 25mm²				
	Ground Floor (From Supply Point to Main DB)	P.Rft	100	2538.04	253,804
	First Floor (From Supply Point to Main DB)	P.Rft	100	2538.04	253,804
83 / P-234	Providing & laying (MAIN or SUB MAIN) PVC insulated & PVC sheathed with 4 core copper conductor 600/1000 volts size 50mm²				
	Ground Floor (From Supply Point to Main DB)	P.Rft	300	4876.85	1,463,055
					9,786,266
TOTAL SCHEDULE ITEMS =					
15% Below As per Notification No.D.S/1385 Dated 24-10-2024 (Except Item No. 80 and 81)					**983,912**
TOTAL SCHEDULE ITEMS =					**8,802,354**

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR

Electrical work

S-NO	DESCRIPTION OF WORK	UNIT	QTY	RATE	AMOUNT

	BASED ON MARKET RATES 2025.	-	-		
1	1 dimmer, 5 Gang Switch Sheet with back box (Clipsal Zen cello Series/Orange/ Legrand/Pakistan Cable or Eq: Socket)				
	Ground Floor	Each	15		
	First Floor	Each	16		
2	5 Gang Switch Sheet with back box (Clipsal Zen cello Series/Orange/ Legrand/Pakistan Cable or Eq: Socket)				
	Ground Floor	Each	20		
	First Floor	Each	20		
3	Providing and installing false ceiling fan (Box Fan) with remote 24" (2' x 2') including connection, complete in all respect as approved by the E/I (Voldam, Pak, Royal).				
	Ground Floor	Each	10		
	First Floor	Each	10		
4	Providing and fixing exhaust fan 12" sweep good quality including making connection complete in all respect or as approved by the E/I as required.				
	Ground Floor	Each	6		
	First Floor	Each	5		
5	Providing and fixing Meson Downlight 59471 MESON200 24W 65K WH Recessed/Surface (Phillips or Eq:)				
	Ground Floor	Each	80		
	First Floor	Each	80		
6	Providing and fixing LED mirror light 20w good quality complete in all respect or as approved by the E/I as required.				
	Ground Floor	Each	6		
	First Floor	Each	6		
7	Providing and fixing LED bulkhead fitting 18w good quality complete in all respect or as approved by the E/I as required. Phillips/Pierlite, or Eq:(Exterior out door IP65 Lights)				

	Ground Floor	Each	35		
	First Floor	Each	35		
8	Providing and fixing LED Tube light 72w good quality complete in all respect or as approved by the E/I as required.				
	Ground Floor	Each	14		
	First Floor	Each	14		
9	Double Multi International Switch Socket (Pakistan Cables/Orange or EQ:) as approved by engineer In charge				
	Ground Floor	P.Sft	60		
	First Floor	P.Sft	62		
	Earthing:-				
10	Providing and fixing Earthing set with 2'x2'x1/8" copper plate buried in the ground at a depth of 12 feet or less if water comes out from the ground level (salt & charcoal, or earthing chemical powder) etc. making the pit 12 feet deep by excavation of all type of soil (except soft or hard rock) including fixing of 2x8 SWG copper wire in 1/2" dia GI conduit complete in as respect including fixing tee and making pit with cover complete as required.	Job	3		
11	Supply and errection of Grounding connecting points. (Earthing System)	Each	1		
	Distribution Boards: -				
	Main DB				

12	Fabrication, supply, installation, testing, and commissioning of a Main Distribution Board, ensuring safe and efficient operation. The DB shall be constructed using a 12 SWG CRCA steel sheet frame and a 14 SWG CRCA steel sheet door, finished with electrostatic powder coating (15-micron thickness) in ANSI 61 Gray / RAL 7035 Light Gray, compliant with IP65 protection for indoor wall-mounted applications with a hinged lockable handle. The DB shall include a 250A, 3P MCCB as the main breaker, a 100A-TP, RYB phase indicators, and a front-mounted energy analyzer. Spare MCBs (2x10A and 2x16A) for auxiliary loads shall be included. The panel will have a 3 phase copper neutral & earthing busbar . Internal wiring shall be done with numbered copper flexible wires, and brass cable glands shall be provided for 4C, 50 Sqmm, and 4C, 25 Sqmm. The scope includes proper mounting, cable termination, performance verification, and compliance with safety standards, ensuring reliable operation for plantation irrigation and general water pumping applications.	No.	1		
	Sub DB				
13	Fabrication, supply, installation, testing, and commissioning of a Sub Main Distribution Board, ensuring safe and efficient operation. The DB shall be constructed using a 12 SWG CRCA steel sheet frame and a 14 SWG CRCA steel sheet door, finished with electrostatic powder coating (15-micron thickness) in ANSI 61 Gray / RAL 7035 Light Gray, compliant with IP65 protection for indoor wall-mounted applications with a hinged lockable handle. The DB shall include main circuit breaker 100A-TP, RYB phase indicators, and a front-mounted energy analyzer. Spare MCBs (2x10A and 2x16A) for auxiliary loads shall be included. The panel will have a 3-phase copper neutral & earthing busbar. Internal wiring shall be done with numbered copper flexible wires, and brass cable glands shall be provided for 4C, 25 Sqmm, the scope includes proper mounting, cable termination, performance verification, and compliance with safety standards, ensuring reliable operation for plantation irrigation and general water pumping applications	No.	1		

14	Providing and fixing Cat-6a Cable including conduit in wall/concrete for internet connection to all of the offices complete in all respect i/c face sheet, back box i/o, PADA, connectors etc. complete in all respect (only fixing of cable with sheet without equipment	P.Meter	500		
TOTAL NON - SCHEDULE ITEMS =					
TOTAL SCHEDULE ITEMS =					
TOTAL ELECTRICAL ITEMS					

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

CONSTRUCTION OF ADMIN BLOCK AT IBA PUBLIC SCHOOL SUKKUR						
12Kwatt Solar System for Admin Block at IBA Public School Sukkur						
Sr#	**Item Detail**	**Brand**	**Qty**	**Unit**	**Rate**	**Amount**
1	Supply, Installation, Testing & Commissioning of Solar Panel Mono-PERC (Crystalline)-545W or >545W with 30 Year linear Warranty & 10 years workmanship warranty with 21 % Efficiency and CE Certified with availability of flash test reports of quality from manufacturer.	Longi/ Canadian Solar	20	Nos		
2	Supply, Installation, Testing & Commissioning of Hybrid Solar Power Inverter (Inverex (Nitrox) /Equivalent), 6 KW with 5 Year Warranty	Inverex-Nitrox Equivalent	2	Nos		
3	Supply, Installation, Testing & Commissioning of Tubular 12V-230Ah (TX-2500 /equivalent)batteries with complete wiring	Phoenix Tubular /Equivalent	8	Nos		

4	Battery Racks /Cabinet	Powder Coated Rust free	1	Nos		
5	PV Breaker (DC)	ABB/Schneider (1500V ,16 A), 2-pole, 16A	4	Nos		
6	Battery Breaker(DC) Schneider/Equivalent with its Battery Cable (DC) Pakistan cables/Equivalent at Losses less than 1%	ABB/Schneider , DC-100A ,2-Pole	1	Job		
7	Battery Breaker Box (IP-54) , GI Powder coated 14 Gauge	Hussain & Co or equivalent	1	Job		
8	Inverter Breaker	ABB/Schneider , AC-32A ,2-Pole	3	Nos		
9	Load breaker -4-Pole-100 A	ABB/Schneider	1	Nos		
10	Change Over Switch	ABB/Schneider	1	Nos		
11	AC DB	Hussain & Co or equivalent (AS Per Site)	1	Job		
12	Earthing cable (1C- 6Sqmm & 1C-25 Sqmm)	Pakistan cables	1	Job		
13	Earthing Pit (Less than 2 Ohm) , Maintenance free & Lightining Protection system for PV Panels & Its structure	Copper made with its accessories	1	Job		
14	DC Cable (6 sq.mm) (Losses less than 1%) with 30 Years warranty	Pakistan cables/Equivalent(As PerSite)	1	Job		
15	AC Cables (Losses less than 1%)(Inverter to Load DB 4C -25sq.mm	Pakistan Cables (As Per Site)	1	Job		
16	Earthing Cable	Pakistan Cables (AS PerSite)	1	Job		
17	Panel Mounting Structure-Galvanised Iron with 14 Guage at 24 degree Tilt Angle	Galvanised Iron	20	Nos		

18	Powder coated 14 guage cable trays with anti rust paint	14-Guage (AS Per Site)	1	Job		
19	Miscellaneous work	As per site	1	Job		
20	Installation and transportation	As per site	1	Job		
Total Amount						

Note: Quoted Premium and Rates must include all taxes, cartage, material differences, no any Cartage, material differences and taxes will be paid Separately

BE-1

Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE

Pursuant to Sub-Clause 43.1 of the General Conditions of Contract, the Works shall be completed on or before the date stated in Appendix-A to Bid. The Bidder shall provide as Appendix-E to Bid, 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 completeeach work item in such a manner that his proposed programme for completion of the whole of the Works and parts of the Works may meet Employer's completion targets in days noted below and counted from the date of receipt of Engineer's Notice to Commence (Attach sheets as required forthe specified form of Construction Schedule):

	Description	**Time for Completion**
a)	Whole Works	_____days
b)	Part-A	_____days (If applicable)
c)	Part-B	_____days (If applicable)
d)	_____	_____days
e)	_____	_____days

BF-1

Appendix-F to Bid

METHOD OF PERFORMING THE WORK

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 accommodation, 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.

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

BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

The Bidder will provide on Sheet 2 of this Appendix 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.

Following is a list of Minimum Equipment Requirement to be brought /installed/ erected at site by the Contractor:

a)	Batching Plant (30 cubic meter per hour capacity)	1 No.
b)	Concrete Pump (Stationary type)	1 No.
c)	Excavator/Shovel/Loader/Tractor	1 Nos.
d)	Concrete Transit Mixers (3-5 cubic meter capacity)	02 No.
e)	Semi-Automatic Mixture Machine	02 No.
h)	Formwork(New marine-ply or steel formwork)	10,000 Sft.
i)	Scaffolding Pipes with all necessary accessories.	15,000 Rft.
j)	Diesel Generator (65 kVA)	1 No.
k)	**Minor M.E.P**	
l)	Concrete Vibrator	02 No.
l)	Plate Compactor	1 No.
m)	Rebar / Steel Cutting and Bending Machine	1 No.
n)	Total Station/Digital Theodolite	1 No.
o)	Level Machine/Dumpy Level	02 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.

Authorized Signature and official Seal: _____

Name:_____

BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

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 which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.

LIST OF MAJOR EQUIPMENT

Owned Purchased or Leased	Description of Unit (Make, Model, Year)	Capacity HP Rating	Condition	Present Location or Source	Date of Delivery at Site	Period of Work on Project
1	2	3	4	5	6	7
a. Owned						
b. To be Purchased						
c. To be arranged on Lease						

BG-2

Appendix-G to Bid

Equipment:

The Bidder must demonstrate that it has the key equipment listed hereafter:

No.	PLANT/EQUIPMENT				
	Equipment Type and Characteristics	**Total Nos. available**	**Under Utilization on other projects, if applicable**	**Nos. waiting to be shifted to new project(s)**	**Min. Number Required for this Project**
1					
2					
3					
4					
5					
6					

CONSTRUCTION CAMP AND HOUSING FACILITIES

The Contractor in accordance with Clause 34 of the Conditions of Contract shall provide description of his construction camp's facilities and staff housing requirements.

The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp.

The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

1. Site Preparation (clearing, land preparation, etc.).

2. Provision of Services.

    a) Power (expected power load, etc.).
    b) Water (required amount and system proposed).
    c) Sanitation (sewage disposal system, etc.).

3. Construction of Facilities

    a) Contractor's Office. Workshop and Work Areas (areas required and proposed layout, type of construction of buildings, etc.).
    b) Warehouses and Storage Areas (area required, type of construction and layout).
    c) Housing and Staff Facilities (Plans for housing for proposed staff, layout, type of construction, etc.).

4. Construction Equipment Assembly and Preparation (detailed plans for carrying out this activity).

5. Other Items Proposed (Security services, etc.). The Contractor should mention here what are his proposed environmental measures for the project as per EPA rules like treatment of wastewater and water quality etc. The Contractor shall submit a detailed EMP (Environmental Management Plan) to describe how materials are removed from site and disposed off at a safe location, prevention for the contamination of ground and surface water in neighboring areas etc. including remedial measures for adoption.

6. Detail of testing Lab with testing equipment etc.

BI-1

Appendix-I to Bid

LIST OF SUBCONTRACTORS

I/We intend to subcontract the following parts of the Work to subcontractors. In my/our opinion, the subcontractors named hereunder are reliable and competent to perform that part of the work for which each is listed.

Enclosed are documentation outlining experience of subcontractors, the curriculum vitae and experience of their key personnel who will be assigned to the Contract, equipment to be supplied by them, size, location and type of contracts carried out in the past.

Part of Works (Give Details)	**Subcontractor (With Complete Address)**
1	2

BJ-1

Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS

Bidder's estimate of the value of work which would be executed by him during each of the periods stated below, based on his Programme of the Works and the Rates in the Bill of Quantities, expressed in thousands of Pakistani Rupees:

Quarter/ Year/ Period	**Amounts (1,000 Rs.)**
1	**2**
Ist Quarter	
2nd Quarter	
3rd Quarter	
4th Quarter	
……	
……	
……	
……	
……	
Bid Price	

BK-1

Appendix-K to Bid

ORGANIZATION CHART
FOR THE
SUPERVISORY STAFF AND LABOUR

(to be filled and signed by the Bidder)

Following is a list of Minimum Staff Requirement to be deployed at site immediately by the Contractor upon commencement of works:

Designation	Nos.	Minimum Qualification	Min. Relevant Working Experience
Project Manager	01	(B.E Civil registered with Pakistan Engineering Council with at least 10 Years Relevant Experience of buildings/ M.E Civil registered with Pakistan Engineering Council with at least 5 Years Relevant Experience of buildings) **(**	10Years
Site Engineer	01	(1) (B.Sc./BE in Civil Engg or B. Tech Civil technology with 5 Years relevant Experience or Site Engineer (02) D.A.E Civil with 10-12 years relevant experience of buildings.)	5 Years/ 10-12Years
Quantity Surveyor Civil	01	(B.Sc./BE or D.A.E Civil with at least 5 to 8 Years Relevant Experience of buildings)	5-8 Years
Electrical Engineer	01	(B.Sc./BE or B. Tech Electrical with at least 5-8 Years Relevant Experience of buildings) **(**	5-8 Years
Surveyor/Draftsman	01	(D.A.E Civil with at least 07 Years Relevant Experience of buildings)	07 Years
Civil Foreman	01	(Intermediate with at least 10 Years relevant experience)	10 Years

Note: If contractor could not deploy required staff at site then for each relevant personnel a deduction will be made from contractor's IPCs on the basis of prevailing market rate as assessed by the Engineer In-charge.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BL-1
Appendix-L to Bid

(INTEGRITY PACT)

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

Contract No._____Dated_____
Contract Value: _____
Contract Title: _____

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

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

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

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

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

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

(LIST OF APPROVED MANUFACTURERS) Appendix-M to Bid

(To be signed by the Bidder)

The Contractor should note that only material from those manufacturers specified in the list of approved manufacturers shall be allowed to be used on this Project. The Contractor shall submit literature/catalogue/samples etc. of all the items from each of the specified manufacturer to the Engineer / Employer who shall then decide and approve the sample and the manufacturer. Where the item involves any finishes such as paints, external coatings, etc. the Contractor shall erect mock-up samples of the specified manufacturers for the selection and approval of the Engineer/Employer.

Onus lies with the Contractor for establishing the genuineness of any material/product item for its make and origin as specified below: -

GENERAL SOURCE OF SUPPLY OF MATERIAL/ GENERAL NOTES

1. Bricks in Pacca brick works used is sub structure will be from Rahim Yar Khan (A-I Quality, approved by Client)
2. Bricks in face brickwork will be from Lahore. (A-I Quality, approved by Client).
3. Fine aggregate (Hill sand) will be from Bholari quarry.
4. Coarse aggregate (Crush stone, Ballast) will be from Ubhan Shah.
5. Deformed Steel from Karachi (60 grade steel by Amreli/Razaque/ Abid/Naveena/as approved) will be used, no any rust will be allowed, at site steel must be covered with plastic covers to save it from humidity/moisture.
6. DG cement (Manufactured at Dera Ghazi Khan)/ Falcon/as approved will be used in all construction work. Proper and adequate steps must be taken for curing.
7. New Steel/marine ply shuttering will be used for RCC work in, columns, slab and beams.
8. Up to plinth level Sulphate Resistant Cement (DG/Falcon/as approved) will be used
9. All material to be used will be laboratory tested along with authentication certificate and finally selected by the client/ Consultant.
10. Use of vibrator is must in every RCC work.
11. Before execution of any activity, shop drawings must be submitted for its approval, than execution, if required sample should be prepared for approval.
12. Batch plant/ Semi Auto mixers shall be used in cementing work.
13. Before start of work proper work schedule for completion on Bar Chart, or on any software-based planning schedule for whole project must be submitted, along with this a fortnightly schedule to monitor and evaluate the progress of work.
14. Qualified and Experienced engineer must be available at site.
15. You must establish site office along with site material testing lab for material testing. All safety measures for Staff, surrounding property etc. must be taken as asked by Client.

FORMS

BID SECURITY
PERFORMANCE SECURITY
CONTRACT AGREEMENT
MOBILIZATION ADVANCE GUARANTEE/BOND
AND
INDEMNITY BOND FOR SECURED ADVANCE

BS-1

BID SECURITY
(**Bank Guarantee/Pay Order)**

Security Executed on _____
(Date)

Name of Surety (Bank) with Address: _____
(Scheduled Bank in Pakistan)

Name of Principal (Bidder) with Address _____

_____

Penal Sum of Security Rupees._____(Rs._____)

Bid Reference No. _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal (Bidder) we, the Surety above named, are held and firmly bound unto

_____

(Hereinafter called the 'Employer') in the sum stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Bidder has submitted the accompanying Bid dated_____for Bid No._____for_____(Particulars of Bid) to the said Employer; and

WHEREAS, the Employer has required as a condition for considering said Bid that the Bidder furnishes a Bid Security in the above said sum from a Scheduled Bank in Pakistan or from a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan, to the Employer,conditioned as under:

(1) that the Bid Security shall remain in force up to and including the date 28 days after the deadline for validity of bids as stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived;

(2) that the Bid Security of unsuccessful Bidders will be returned by the Employer after expiry of its validity or upon signing of the Contract Agreement; and

(3) that in the event of failure of the successful Bidder to execute the proposed Contract Agreement for such work and furnish the required Performance Security, the entire said sum be paid immediately to the said Employer pursuant to Clause 15.6 of the Instruction to Bidders for the successful Bidder's failure to perform.

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

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

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

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

SURETY (Bank)

WITNESS: Signature _____

1. _____ Name _____

_____ Title _____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

PS-1

FORM OF PERFORMANCE SECURITY
(Bank Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address:_____
(Scheduled Bank in Pakistan)
Name of Principal (Contractor) with address:_____
_____
Penal Sum of Security (express in words and figures)_____
_____
Letter of Acceptance No._____Dated _____

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

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ _____ (Name of Contract) for the _____ _____(Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 49, Defects Liability, 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 defenses under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

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

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

_____
Guarantor (Bank)

Witness:

1. _____ Signature _____

_____ Name_____
Corporate Secretary (Seal)

Title _____

2. _____

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

CA-1

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of_____(month) 20_____ between _____ (hereafter called the ("Employer") of the one part and _____(Hereafter called the "Contractor") of the otherpart.

WHEREAS the Employer is desirous that certain Works, viz_____should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnesses as follows:

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

2. The following documents after incorporating addenda / Clarification as agreed or otherwise, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Contract, viz:

   (a) The Contract Agreement;
   (b) The Letter of Acceptance;
   (c) The completed Form of Bid;
   (d) Special Stipulations (Appendix-A to Bid);
   (e) The Particular Conditions of Contract – Part II;
   (f) The General Conditions – Part I;
   (g) The priced Bill of Quantities (Appendix-D to Bid);
   (h) The completed Appendices to Bid (B, C, E to O);
   (i) The Drawings;
   (j) The Specifications.
   (k) _____(any other)

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)

MG-1

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 Rupees_____(Rs_____) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS, the Employer has asked the Contractor to furnish Guarantee to secure the mobilization advance for the performance of his obligations under the said Contract.

AND WHEREAS, _____
(Scheduled Bank in Pakistan) (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 saidGuarantee.

NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above-mentioned Contract and if he fails and commits default in fulfillment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Employer shall be the sole and final judge, on the part of the Contractor, shall be given by the Employer to the Guarantor, and on such first written demand, payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This Guarantee shall 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 Rupees _____(Rs_____).

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 payments from 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

1. Signature _____
2. Name _____
3. Title _____

WITNESS

1. _____

_____
Corporate Secretary (Seal)

2. _____ _____
(Name Title & Address) Corporate Guarantor (Seal)

IB-1

INDEMNITY BOND

FOR SECURED ADVANCE

AGAINST MATERIALS BROUGHT AT SITE

(ON RS.40 NONJUDICIAL STAMP PAPER)

This Deed of Indemnity is issued by M/s. _____ _____ *(Name* of *the Contractor)* in favour of *M/s.*_____*(Name* of *the Employer).*

Whereas_____(hereinafter called the Employer) has paid the Secured Advance against the cost of material through any Bank or like agency by any other method by virtue of the terms of the contract existing between the parties. The details of the material and their price for which secured advance is being sought for the period _____till consumption of the material is as under:-

1. _____ at Rs._____ per_____= Rs.
2. _____ at Rs._____ per_____= Rs.
3. _____ at Rs._____ per_____= Rs.
4. _____ at Rs._____ per_____= Rs.

THEREFORE, THIS DEED OF INDEMNITY WITHNESSETH AS FOLLOWS:

I/We_____of M/s. _____ do hereby indemnify M/s_____for all losses due to thefts, arson, pilferage, loss due to flood and inundation, shortage, deterioration and depreciation etc. through any act of Man or God or slump in the Market of any or all the materials financed or paid by the Employer on our request for financing payment against material.

I/We_____shall indemnify_____against any or all claims, action damages arising out of or resulting to the said material.

I/We_____further declare that we will faithfully abide by the above declaration and solemnly affirm that we will not remove, sell, pilferage any of the materials against which M/s_____has paid us such a secured advance and will not pledge the same with any Bank, Finance Corporation, Firm, Company, Individual or the like agency or create any change whereon in any from what so ever.

I/We_____ do hereby also declare that in the event of my/our infringement of the declaration made above _____ will be entitled to forfeit all such

material and also proceed against me/us according to the relevant clause pertaining to breach of contract and further invoke the power or seek any remedies secured of _____ under the contract Agreement signed with us or otherwise available under law.

Place_____Dated _____

Contractor _____

AFFIDAVIT

IB-1

I._____S/O _____Muslim, adult Holding CNIC

No._____Resident of _____.

_____, do herby declare on oath and solemnly as under: -

1. That I am the deponent of this affidavit and fully conversant with the facts mentioned herein.

2. That I am the Owner/Partner/Director of_____situated at _____, Sukkur/City name.

3. That I hereby further declare on oath that my firm never remains black listed with any government authorities/office or in private sector or with any entity.

4. That my firm is not involved in any dispute, litigation or Arbitration with any person, with any department of Federal/ Provincial or City Government, Agencies, or Organization, in any court of Law. Further, I and my firm are never indulged in any corrupt, fraudulent and collusive practices.

5. That our firm is Technically & Financially strong & capable to do the tendered work.

That whatever stated above is true and correct of the best of my knowledge and belief.

Karachi – Dated _____

_____

DEPONENT

[Notes on the Conditions of Contract]

The Conditions of Contract comprise two parts:

(a) Part I - General Conditions of Contract
(b) Part II - Particular Conditions of Contract

Over the years, a number of "model" General Conditions of Contract have evolved. The one used in these Standard Bidding Documents was prepared by the International Federation of Consulting Engineers (Federation International des Ingenieurs-Conseils, or FIDIC), and is commonly known as the FIDIC Conditions of Contract.(The used version is the fourth edition, 1987, reprinted in 1992 with further amendments).

The FIDIC Conditions of Contract have been prepared for an ad measurement (unit price or unit rate) type of contract, and cannot be used without major modifications for other types of contract, such as lump sum, turnkey, or target cost contracts.

The standard text of the General Conditions of Contract chosen must be retained intact to facilitate its reading and interpretation by bidders and its review by the Client. Any amendments and additions to the General Conditions, specific to the contract in hand, should be introduced in the Particular Conditions of Contract.

The use of standard conditions of contract for all civil Works will ensure comprehensiveness of coverage, better balance of rights or obligations between Employer and Contractor, general acceptability of its provisions, and savings in time and cost for bid preparation and review, leading to more economic prices.

The FIDIC Conditions of Contract are copyrighted and may not be copied, faxed, or reproduced. Without taking any responsibility of its being accurate, Pakistan Engineering Council with prior consent of FIDIC Secretariat, has reproduced herein the FIDIC General **Conditions of Contract for reference purpose only which cannot be used by the users** for preparing their bidding documents. The bidding document may include a purchased copy, the cost of which can be retrieved as part of the selling price of the bidding document. Alternatively, the FIDIC Conditionsof Contract can be referred to in the bidding documents, and the bidders are advised to obtain copies directly from FIDIC.*

CONDITIONS OF CONTRACT

FOR WORKS OF CIVIL

ENGINEERING CONSTRUCTION

PART I GENERAL CONDITIONS

WITH FORMS OF TENDER AND AGREEMENT

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PART II - PARTICULAR CONDITIONS OF CONTRACT
(Mandatory Provisions not to be Amended / Substituted except as instructed by PEC)

1.1 Definitions

(a) (i) The Employer is **Sukkur IBA University, Sukkur**

(a) (iv) The Engineer is **Project Director, Sukkur IBA University**.

The following paragraph is added:

(a) (vi) "Bidder or Tenderer" means any person or persons, company, corporation, firm or Joint venture submitting a Bid or Tender.

(b) (v) The following is added at the end of the paragraph:

The word "Tender" is synonymous with "Bid" and the word "Tender Documents" with "Bidding Documents".

The following paragraph is added:

(b) (ix) "Programme" means the programme to be submitted by the Contractor in Accordance
Accordance with Sub-Clause 14.1 and any approved revisions thereto.

(e) (i) The text is deleted and substituted with the following:

"Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works subject to such additions thereto or deductions there from as may be made and remedying of any defects therein in accordance with the provisions of the Contract.

2.1 Engineer's Duties and Authority

With reference to Sub-Clause 2.1(b), the following provisions shall also apply:
The Engineer shall obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses. The Employer may further vary according to need of the project;

(i) Consenting to the sub-letting of any part of the Works under Sub-Clause 4.1 "Subcontracting".

(ii) Certifying additional cost determined under Sub-Clauses 12.2 "Not Foreseeable Physical Obstructions or conditions"

(iii) Any action under Clause 10 "Performance Security" and Clauses 21,23,24 & 25 "Insurance" of sorts.

(iv) Any action under Clause 40 "Suspension"

(v) Any action under Clause 44 "Extension of Time for Completion"

(vi) Any action under Clause 47 "Liquidated Damages for Delay" or payment of Bonus for Early Completion of Works (PCC Sub-Clause 47.3)

(vii) Issuance of "Taking over Certificate" under Clause 48.

(viii) Issuing a Variation Order under Clause 51 except:

a) in an emergency* situation, as stated here below, or

b) if such variation would increase the Contract Price by the amount stated in the Appendix-A to Bid.

(ix) Fixing rates or prices under Clause 52.

(x) Extra payment as a result of Contractor's claims Clause

(xi) Release of Retention Money to the Contractor under Sub-Clause 60.3 "Payment of Retention Money".

(xii) Issuance of "Final Payment Certificate" under Sub-Clause 60.8.

(xiii) Issuance of "Defect Liability Certificate" under Sub-Clause 62.1.

(xiv) Any change in the ratios of Contract currency proportions and payments thereof under clause 72 "Currency and Rate of Exchange".

(Note: Employer may further vary according to need of the project)

* (If in the opinion of the Engineer an emergency occurs affecting the safety of life or of the Works or of adjoining property, the Engineer may, without relieving the Contractor of any of his duties and responsibilities 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 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 52 and shall notify the Contractor accordingly, with a copy to the Employer.)

2.2 Engineer's Representative

Add the following paragraph:
The Employer shall ensure that the Engineer's Representative is a professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976).

The following Sub-Clauses 2.7 and 2.8 are added:

2.7 Engineer Not Liable

Approval, reviews and inspection by the Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of materials, plant and equipment for construction of the Works and their parts in accordance with the Contract and neither the Engineer's authority to act nor any decision made by him in good faith as provided for under the Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibilityof the Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any portion of the Works.

2.8 Replacement of the Engineer

"If the Employer intends to replace the Engineer, the Employer shall, not less than 14 days before the intended date of replacement, give notice to the Contractor, of the name, address and relevant experience of the intended replacement Engineer. The Employer shall not replace the Engineer with a person against whom the Contractor raises reasonable objection by notice to the Employer, with supporting particulars."

Subcontracting

The Contractor shall not subcontract the whole of the Works. Except where otherwise provided by the Contract, the Contractor shall not subcontract any part of the Works without the prior consent of the Engineer. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents servants or workmen.

Provided that the Contractor shall not be required to obtain such consent for:

(a) the provision of labor,

(b) the purchase of materials which are in accordance with the standards specified in the Contract,

(c) the subcontracting of any part of the Works for which the Subcontractor is named in the Contract.

5.1 Language(s) and Law

(a) The Contract Documents shall be drawn up in the English language.
(b) The Contract shall be subjected to the Laws of Islamic Republic of Pakistan

5.2 Priority of Contract Documents

The documents listed at (1) to (6) of the Sub-Clause are deleted and substituted with the following:

(1) The Contract Agreement (if completed);
(2) The Letter of Acceptance;
(3) The completed Form of Bid;
(4) Special Stipulations (Appendix-A to Bid);
(5) The Particular Conditions of Contract – Part II;
(6) The General Conditions – Part I;
(7) The priced Bill of Quantities (Appendix-D to Bid);
(8) The completed Appendices to Bid (B, C, E to L);
(9) The Drawings;
(10) The Specifications; and
(11) ____(any other).

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by a drawing of later date regardless of scale. All Drawings and Specifications shall be interpreted in conformity with the Contract and these Conditions. Addendum, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

The following Sub-Clauses 6.6 and 6.7 are added

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

6.7 As-Built Drawings

At the completion of the Works under the Contract, the Contractor shall furnish to the Engineer 6 copies and one reproducible of all drawings amended to conform with the Works as built. The price of such Drawings shall be deemed to be included in the Contract Price.

10.1 Performance Security

The text is deleted and substituted with the following:

The Contractor shall provide Performance Security to the Employer in the prescribed form. The said Security shall be furnished or caused to be furnished by the Contractor within 28 days after the receipt of the Letter of Acceptance. The Performance Security shall be of an amount equal to 5% of the Contract Price stated in the Letter of Acceptance. Such Security shall, at the option of the bidder, be in the form of either (a) bank guarantee from any Scheduled Bank in Pakistan or (b) bank guarantee from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan .

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

The following Sub-Clause10.4 is added:

10.4 Performance Security Binding on Variations and Changes

The Performance Security shall be binding irrespective of changes in the quantities or variations in the Works or extensions in Time for Completion of the Works which are granted or agreed upon under the provisions of the Contract.

12.1 Not Foreseeable Physical Obstructions or Conditions

If, however, during the execution of the Works the Contractor encounters physical obstructions or physical conditions, other than climatic conditions on the Site, which obstructions or conditions were, in his opinion, not foreseeable by an experienced contractor, the Contractor shall forthwith give notice thereof to the Engineer, with a copy to the Employer. On receipt of such notice, the Engineer shall if in his opinion such obstructions or conditions could not have been reasonably foreseen by an experienced contractor, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 44, and

(b) the amount of any costs which may have been incurred by the Contractor by reason of such obstructions or conditions having been encountered, which shall be added to the Contract Price,

and shall notify the Contractor accordingly, with a copy to the Employer. Such determination shall take account of any instruction which the Engineer may issue to the Contractor in connection therewith, and any proper and reasonable measures acceptable to the Engineer which the Contractor may take in the absence of specific instructions from the Engineer.

14.1 Programme to be submitted (If required by the Employer)

The programme shall be submitted within 28 days from the date of receipt of Letter ofAcceptance, which shall be in the form of:

i) a Bar Chart identifying the critical activities.

ii) a CPM identifying the critical path/activities.

(Employer to select appropriate one)

14.3 Cash Flow Estimate to be submitted

The detailed Cash Flow Estimate shall be submitted within 21 days from the date of receipt of Letter of Acceptance

The following Sub-Clause 14.5 is added:

14.5 Detailed Programme and Monthly Progress Report

a) For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer detailed programme for the following:

(1) Execution of Works;
(2) Labor Employment;
(3) Local Material Procurement;
(4) Material Imports, if any; and
(5) Other details as required by the Engineer.

(b) During the period of the Contract, the Contractor shall submit to the Engineer not later than the 8th day of the following month, 10 copies each of Monthly Progress Reports covering:

(1) A Construction Schedule indicating the monthly progress in percentage;
(2) Description of all work carried out since the last report;
(3) Description of the work planned for the next 56 days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
(4) Monthly summary of daily job record;
(5) Photographs to illustrate progress; and
(6) Information about problems and difficulties encountered, if any, and proposals to overcome the same.

(c) During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer as and when requested. The daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's s equipment.

The following Sub-Clauses 15.2 and 15.3 are added:

15.2 Language Ability of Contractor's Representative

The Contractor's authorized representative shall be fluent in the English language. Alternately an interpreter with ability of English language shall be provided by the Contractor on full time basis.

15.3 Contractor's Representative

The Contractor's authorized representative and his other professional engineers working at Site shall register themselves 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.

The following Sub-Clauses 16.3 and 16.4 are added:

16.3 Language Ability of Superintending Staff of Contractor

A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language. If the Contractor's superintending staff are not fluent in English language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

16.4 Employment of Local Personnel

The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor from sources within Pakistan.

The following Sub-Clauses 19.3 and 19.4 are added:

19.3 Safety Precautions

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 make, maintain and submit reports to the Engineer concerning safety, health and welfare of persons and damage to property, as the Engineer may from time to time prescribe.

19.4 Lighting Work at Night

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's Representative.

20.4 Employer's Risks

The Employer's risks are:

Delete the text and substitute with the following:

(a) insofar as they directly affect the execution of the Works in Pakistan:

(i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
(ii) rebellion, revolution, insurrection, or military or usurped power, or civil war,
(iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
(iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,

(v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;

(b) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract;

(c) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible; and

(d) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:

(i) could not have reasonably foreseen, or
(ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:
(a) prevent loss or damage to physical property from occurring by taking appropriate measures, or
(b) insure against.

21.1 Insurance of Works and Contractor's Equipment

(Employer may vary this Sub-Clause 21.1 (b))

21.4 Exclusions

The text is deleted and substituted with the following:

There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by the risks listed under Sub-Clause 20.4 paras (a) (i) to (iv).

The following Sub-Clause 25.5 is added:

22.1 Damage to Persons and Property

The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:

(a) death of or injury to any person, or

(b) loss of or damage to any property (other than the Works),

which may arise out of or in consequence of the execution and completion of the Works and the remedying of any defects therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, subject to the exceptions defined in Sub-Clause 22.2.

22.2 Exceptions

The "exceptions" referred to in Sub-Clause 22.1 are:

(a) the permanent use or occupation of land by the Works, or any part thereof,

(b) the right of the Employer to execute the Works, or any part thereof, on, over, under, is or through any land,

(c) damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any defects therein, in accordance with the Contract, and

(d) death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Employer, his agents servants or other contractors, not being employed by the Contractor, or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or, where the injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the injury or damage.

23.1 Third Party Insurance (including Employer's Property)

The Contractor shall, without limiting his or the Employer's obligation and responsibilities under Clause 22, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person (other than as provided in Clause 24) or loss of or damage to any property (other than the Works) arising out of the performance of the Contract, other than the exceptions defined in paragraphs (a), (b) and (c) of Sub-Clause 22.2.

23.2 Minimum Amount of Insurance

Such insurance shall be for at least the amount stated in the Appendix to Tender.

23.3 Cross Liabilities

The insurance policy shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Employer as separate insureds.

24.1 Accident or Injury to Workmen

The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or any Subcontractor, other than death or injury resulting from any act or default ofthe Employer, his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the Employer is liable as aforesaid, and against all claims, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto.

24.2 Insurance Against Accident to Workmen

The Contractor shall insure against such liability and shall continue such insurance during the whole of the time that any persons are employed by him on the Works.

Provided that, in respect of any persons employed by any Subcontractor, the Contractor's obligations to insure as aforesaid under the Sub-Clause shall be satisfied if the Subcontractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy,but the Contractor shall require such Subcontractor to produce to the Employer, when required, such policy of insurance and the receipt for the payment of the current premium.

25.5 Insurance Company

The Contractor shall be obliged to place all insurances relating to the Contract (including, but not limited to, the insurances referred to in Clauses 21, 23 and 24) with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

Costs of such insurances shall be borne by the Contractor.

The following Sub-Clause 31.3 is added:

31.3 Co-operation with other Contractors

During the execution of the Works, the Contractor shall co-operate fully with other contractors working for the Employer at and in the vicinity of the Site and also shall provide adequate precautionary facilities not to make himself a nuisance to local residents and other contractors.

The following Sub-Clauses 34.2 to 34.12 are added:

34.2 Rates of Wages and Conditions of Labor

The Contractor shall pay rates of' wages and observe conditions of labor not less favorable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labor so established, the Contractor shall pay rates of wages and observe conditions of labor which are not less favorable than the general level of wages and conditions observed by other employers whose general circumstances in the trade or in industry in which the Contractor is engaged are similar.

34.3 Employment of Persons in the Service of Others

The Contractor shall not recruit his staff and labor from amongst the persons in the services of the Employer or the Engineer; except with the prior written consent of the Employer or the Engineer, as the case may be.

34.4 Housing for Labor

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labor, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be handed over to the Employer or if the Employer so desires, the temporary camps or

housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

34.5 Health and Safety

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labor at all times throughout the period of the Contract. The Contractor shall further ensure that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements.

34.6 Epidemics

In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities, for purpose of dealing with and overcoming the same.

34.7 Supply of Water

The Contractor shall, so far as is reasonably practicable, having regard to local conditions**,** provide on the Site, to the satisfaction of the Engineer or his representative, adequate supply of drinking and other water for the use of his staff andlabor.

34.8 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, staff or labor.

34.9 Arms and Ammunition

The Contractor shall not give, or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

34.10 Festivals and Religious Customs

The Contractor shall in all dealings with his staff and labour have due regard to all recognized festivals, days of rest and religious and other customs.

34.11 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst staff and labour and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.

34.12 Compliance by Subcontractors

The Contractor shall be responsible for compliance by his Subcontractors of the

provisions of this Clause.

The following Sub-Clauses 35.2 and 35.3 are added:

35.2 Records of Safety and Health

The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.

35.3 Reporting of Accidents

The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.

The following Sub-Clause 36.6 is added:

36.6 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.

39.1 Removal of Improper Work, Materials or Plant

The Engineer shall have authority to issue instructions from time to time, for:

(a) the removal from the Site, within such time or times as may be specified in the instruction, of any materials or Plant which, in the opinion of the Engineer, are not in accordance with the Contract,

(b) the substitution of proper and suitable materials or Plant, and

(c) the removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any work which, in respect of

(i) materials, Plant or workmanship, or

(ii) design by the Contractor or for which he is responsible,

is not, in the opinion of the Engineer, in accordance with the Contract

40.1 Suspension of Work

The Contractor shall, on the instructions of the Engineer, suspend the progress of the Works or any part thereof for such time and in such manner as the Engineer may consider necessary and shall, during such suspension, properly protect and secure the Works or such part thereof so far as is necessary in the opinion of the Engineer. Unless such suspension is:

(a) otherwise provided for in the Contract,

(b) necessary by reason of some default of or breach of contract by the Contractor or for which he is responsible,

(c) necessary by reason of climatic conditions of the Site, or

(d) necessary for the proper execution of the Works or for the safety of the Works or any part thereof (save to the extent that such necessity arises from any actor default by the Engineer or the Employer or from any of the risks defined in Sub-Clause 20.4), Sub-Clause 40.2 shall apply.

40.2 Engineer's Determination following Suspension

Where, pursuant to Sub-Clause 40.1, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 44, and

(b) the amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension,

and shall notify the Contractor accordingly, with a copy to the Employer.

40.3 Suspension lasting more than 84 Days

If the progress of the Works or any part thereof is suspended on the written instructions of the Engineer and if permission to resume work is not given by the Engineer within a period for 84 days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of Sub-Clause 40.1, the Contractor may give notice to the Engineer requiring permission, within 28 days from the receipt thereof, to proceed with the Works or that part thereof in regard to which progress is suspended. If, within the said time, such permission is not granted, the Contractor may, but is not bound to, elect to treat the suspension, where it affects part only of the Works, as an omission of such part under Clause 51 by giving a further notice to the Engineer to that effect, or, where it affects the whole of the Works, treat the suspension as an event of default by the Employer and terminates his employment under the Contract in accordance with the provisions of Sub-Clause 69.1, whereupon the provisions of Sub-Clause 69.2 and 69.3 shall apply.

41.1 Commencement of Works

The text is deleted and substituted with the following:

The Contractor shall commence the Works on Site within the period named in Appendix-A to Bid from the date of receipt by him from the Engineer of a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

The following Sub-Clause 47.3 is added:

43.1 **Time for Completion**

The whole of the Works and, if applicable, any Section required to be completed within a particular time as stated in the Appendix to Tender, shall be completed, in accordance with the provisions of Clause 48.1, within the time stated in the Appendix to Tender for the whole of the Works or the Section (as the case may be), calculated from the Commencement Date, or such extended time as may be allowed under Clause 44.1.

44.1 Extension of Time for Completion

In the event of:

(a) the amount or nature of extra or additional work,

(b) any cause of delay referred to in these Conditions,

(c) exceptionally adverse climatic conditions,

(d) any delay, impediment or prevention by the Employer, or

(e) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,

Being such as fairly to entitle the Contractor to an extension of the Time for Completion of the Works, or any Section or part thereof, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of such extension and shall notify the Contractor accordingly, with a copy to the Employer.

47.1 Liquidated Damages for Delay

If the Contractor fails to comply with the Time for Completion in accordance with Clause 48, for the whole of the Works or, if applicable, any Section within the relevant time prescribed by Clause 43, then the Contractor shall pay to the Employer the relevant sum stated in the Appendix to Tender as liquidated damagesfor such default and not as a penalty (which sum shall be the only monies due fromthe Contractor for such default) for every day or part of a day which shall elapse between the relevant Time for Completion and the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, subject to the applicable limit stated in the Appendix to Tender. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

47.2 Reduction of Liquidated Damages

If, before the Time for Completion of the whole of the Works or, if applicable, any Section, a Taking-Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over Certificate, and in the absence of Alternative provisions in the

Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

47.3 Bonus for Early Completion of Works

The Contractor shall in case of earlier completion for either whole or part(s) of the Works pursuant to Sub-Clauses 48.1 and 48.2(a) respectively of the General Conditions of Contract, be paid bonus up-to a limit and at a rate equivalent to 50% of the relevant limit and rate of liquidated damages prescribed in Appendix-A to Bid "Special Stipulations".

48.1 Taking-Over Certificate

When the whole of the Works has been substantially completed and have satisfactorily passed any Tests on Completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer with a copy to the Employer, accompanied by a written undertaking to finish with due expedition any outstanding work during the Defects Liability Period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-Over Certificate in respect of the Works. The Engineer shall within 21 daysof the date of delivery of such notice, either issue to the Contractor, with a copy to the Employer, a Taking-Over Certificate, stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, is required to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the Woks specified therein. The Contractor shall be entitled to receive such Taking-Over Certificate within 21 days of completion, to the satisfaction of the Engineer, of the Works so specified and remedying any defects so notified.

48.2 Taking Over of Sections or Parts

For the purposes of para (a) of this Sub-Clause, separate Times for Completion shall be provided in the Appendix-A to Bid "Special Stipulations".

49.1 Defects Liability Period

In these Conditions the expression "Defects Liability Period" shall mean the defects liability period named in the Appendix to Tender, calculated from:

(a) the date of completion of the Works certified by the Engineer in accordance with Clause 48, or

(b) in the event of more than one certificate having issued by the Engineer under Clause 48, the respective dates so certified,

and in relation to the Defects Liability Period the expression "the Works" shall be construed accordingly.

50.1 **Contractor to Search**

If any defect, shrinkage or other fault in the Works appears at any time prior to the end of the Defects Liability Period, the Engineer may instruct the Contractor, with a copy to the Employer, to search under the directions of the Engineer for the cause thereof. Unless such defect, shrinkage or other fault is one for which the Contractor is liable under the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount in respect of the costs of such search incurred by the Contractor, which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer. If such defect, shrinkage or other fault is one for which the Contractor is liable, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case remedy such defect, shrinkage or other fault at his own cost inaccordance with the provisions of Clause 49.

51.1 Variations

The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

(a) increase or decrease the quantity of any work included in the Contract,
(b) omit any such work (but not if the omitted work is to be carried out by the Employer or by another contractor),
(c) change the character or quality or kind of any such work,
(d) change the levels, lines, position and dimensions of any part of the Works,
(e) execute additional work of any kind necessary for the completion of the Works, or
(f) change any specified sequence or timing of construction of any part of the Works.

No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 52. Provided that where the issue of an instruction to vary the Works is necessitated bysome default of or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor

51.2 Valuation of Variations

In the tenth line, after the words “Engineer shall” the following is added:
Within a period not exceeding one-eighth of the completion time subject to a minimum of 56 days from the date of disagreement whichever is later.

52.1 Instructions for Variations

At the end of the first sentence, after the word “Engineer", the words “in writing” are added.

53.4 Failure to Comply

This Sub-Clause is deleted in its entirety.

54.3 Customs Clearance

(Employer may vary this Sub-Clause)

54.5 Conditions of Hire of Contractor's Equipment

The following paragraph is added:

The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor's Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for thehire thereof contains a provision in accordance with the requirements set forth above.

The following Sub-Clauses 59.4 & 59.5 are added:

56.1 Works to be Measured

The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value of the Works in accordance with the Contract and the Contractor shall be paid that value in accordance with Clause 60. The Engineer shall, when he requires any part of the Works to be measured, give reasonable notice to the Contractor's authorized agent, who shall:

(a) forthwith attend or send a qualified representative to assist the Engineer in making such measurement, and

(b) supply all particulars required by the Engineer.

Should the Contractor not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of such part of the Works. For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within 14 days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

59.4 Payments to Nominated Subcontractors

The Contractor shall pay to the nominated Subcontractor the amounts which the

Engineer certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with Clause 58 [Provisional Sums], except as stated in Sub-Clause 59.5 [Certification of Payments].

59.5 Certification of Payments & Nominated Subcontractors

Before issuing a Payment, Certificate which includes an amount payable to a nominated Subcontractor, the Engineer may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due inaccordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:

(a) satisfies the Engineer in writing that he has reasonable cause for withholding or refusing to make such payment, and

(b) produces to the Engineer reasonable proof that he has so informed such nominated Subcontractor in writing,

then the Employer may (at his sole discretion) pay direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.

60.1 Monthly Statements

In the first line after the word "shall", the following is added:

"on the basis of the joint measurement of work done under Clause 56.1,"

In Para (c) the words "the Appendix to Tender" are deleted and substituted with the words "Sub-Cause 60.11 (a)(6) hereof".

(in case Clause 60.11 is applicable)

60.2 Monthly Payments

In the first line, "28" is substituted by "14".

60.3 Payment of Retention Money

(a) Upon the issue of the Taking-Over Certificate with respect to the whole of the Works, one half of the Retention Money, or upon the issue of a Taking-Over Certificate with respect to a Section or part of the Permanent

Works only such proportion thereof as the Engineer determines having regard to the relative value of such Section or part of the Permanent Works, shall be certified by the Engineer for payment to the Contractor.

(b) Upon the expiration of the Defects Liability Period for the Works the other

half of the Retention Money shall be certified by the Engineer for payment to the Contractor. Provided that, in the event of different Defects Liability Periods having become applicable to different Sections or part of the Permanent Works pursuant to Clause 48, the expression "expiration of the Defects Liability Period" shall, for the purposes of this Sub-Clause, be deemed to mean the expiration of the latest of such periods. Provided also that if at such time, there shall remain to be executed by the Contractor any work instructed, pursuant to Clause 49 and 50,in respect of the Works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention Money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

60.8 Final Payment Certificate

Within 28 days after receipt of the Final Statement, and the written discharge, the Engineer shall issue to the Employer (with a copy to the Contractor) a Final Payment Certificate stating:

(a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and

(b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled other than under Clause 47, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

60.10 Time for Payment

The text is deleted and substituted with the following:

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 47, be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate has been jointly verified by Employer and Contractor, or, in the case of the Final Certificate referred to in Sub Clause 60.8, within 60 days after such Final Payment Certificate has been jointly verified by Employer and Contractor; Provided that the Interim Payment shall be caused in 42 days and Final Payment in 60 days in case of foreign funded project. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor compensation at the 28 days rate of KIBOR+2% per annum for local currency and LIBOR+1% for foreign currency, upon all sums unpaid from the date by which the same should have been paid. The provisions of this Sub- Clause are without prejudice to the Contractor's entitlement under Clause 69.

The following Sub-Clause 60.11is added:

60.11 Secured Advance on Materials

a) The Contractor shall be entitled to receive from the Employer Secured Advance against an indemnity bond acceptable to the Employer of such sum as the Engineer may consider proper in respect of non-perishable materials brought at the Site but not yet incorporated in the Permanent Works provided

that:

(1) The materials are in accordance with the Specifications for the Permanent Works;

(2) Such materials have been delivered to the Site and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer but at the risk and cost of the Contractor;

(3) The Contractor's records of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records shall be available for inspection by the Engineer;

(4) The Contractor shall submit with his monthly statement the estimated value of the materials on Site together with such documents as may be required by the Engineer for the purpose of valuation of materials and providing evidence of ownership and payment therefor;

(5) Ownership of such materials shall be deemed to vest in the Employer and these materials shall not be removed from the Site or otherwise disposed of without written permission of the Employer; and

(6) The sum payable for such materials on Site shall not exceed 75 % of the (i) landed cost of imported materials, or (ii) ex-factory / ex-warehouse price of locally manufactured or produced materials, or (iii) market price of other materials.

(b) The recovery of Secured Advance paid to the Contractor under the above provisions shall be effected from the monthly payments on actual consumptionbasis.

60.12 Financial Assistance to Contractor

Financial assistance shall be made available to the Contractor by the Employer by adopting any one of the following three Alternatives**:**

(Appropriate alternative only to be retained)

Alternative One: Mobilization Advance

(1) An interest-free Mobilization Advance up to 10 % of the Contract Price stated in the Letter of Acceptance shall be paid by the Employer to the Contractor in two equal parts upon submission by the Contractor of a Mobilization Advance Guarantee/Bond for the full amount of the Advance in the specified form froma Scheduled Bank in Pakistan .First part within 14 days after signing of the Contract Agreement or date of

receipt of Engineer's Notice to Commence, whichever is earlier; and

(2) 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.

(b) This Advance shall be recovered in equal installments; first installment at the expiry of third month after the date of payment of first part of Advance and the last installment two months before the date of completion of the Works as per Clause 43 hereof.

Alternative Two: Mobilization/ Demobilization Cost (Not Applicable).

Mobilization Cost shall be paid to the Contractor as a part of the priced Bill of Quantities. This cost shall not exceed 10 % of the Tender Price and shall be paid to the Contractor as follows:

(i) 80 % of the Mobilization Cost shall be paid for mobilization at Site. This payment shall be in three stages as follows:

Stage I: 20 % of Mobilization Cost upon obtaining and furnishing of Performance Security and insurance policies and construction of camp and housing facilities as required under the Contract;

Stage II: 30 % of Mobilization Cost upon providing & installing preliminary requirements of Contractor's Equipment, materialsand temporary structures for the commencement of Works to the satisfaction of the Engineer and achieving 3 % value of the Works (excluding payment under Stage-I);

Stage III: 30 % of Mobilization Cost upon providing balance Contractor's Equipment to complete full requirement for the entire work and after achievement of progress to the extent of 6 % value of the Works (excluding payments under Stages I and II); and

(ii) 20 % of Mobilization Cost shall be paid for operation and maintenance of the constructed facilities and for demobilization as per schedule of payment to be submitted by the Contractor in accordance with Clause 57.2 and approved by the Engineer.

Alternative Three: Materials Supplied by Employer (Not Applicable)

The Employer shall supply to the Contractor materials, like cement, steel, bitumen or any other material whichever deemed necessary to complete the project; and the cost

thereof shall be recovered from the Contractor through monthly statements on the basis of actual consumption.

The list of materials, quantities and rates to be charged to the Contractor shall be provided along with Appendix-A to Bid "Special Stipulations".

(Employer may opt either "Secured Advance on Materials" or "Financial Assistance to Contractor")

62.1 Defects Liability Certificate

The Contract shall not be considered as completed until a Defects Liability Certificate shall have been signed by the Engineer and delivered to the Employer, with a copy to the Contractor, stating the date on which the Contractor shall have completed his obligations to execute and complete the Works and remedy any defects therein to the Engineer's satisfaction. The Defects Liability Certificate shall be given by the Engineer within 28 days after the expiration of the Defects Liability Period, or, if different defects liability periods shall become applicable to different Sections or parts of the Permanent Works, the expiration of the latest such period, or as soon thereafter as any works instructed, pursuant to Clause 49 and 50, have been completed to the satisfaction of the Engineer. Provided that the issue of the Defects Liability Certificate shall not be a condition precedent to payment to the Contractor of the second portion of the Retention Money in accordance with the conditions set out in Sub-Clause 60.3.

63.1 Default of Contractor

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

Provided further that in addition to the action taken by the Employer against the Contractor under this Clause, the Employer may also refer the case of default of the Contractor to Pakistan Engineering Council for punitive action under the Construction and Operation of Engineering Works Bye-Laws 1987, as amended from time to time.

63.3 Payment after Termination

If the Employer terminates the Contractor's employment under this Clause, he shall not be liable to pay to the Contractor any further amount (including damages) in respect of the Contract until the expiration of the Defects Liability Period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Employer have been ascertained and the amount thereof certified

by the Engineer. The Contractor shall then be entitled to receive only such sum (if any) as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

63.4 Assignment of Benefit of Agreement

Unless prohibited by law, the Contractor shall, if so instructed by the Engineer within 14 days of such entry and termination referred to in Sub-Clause 63.1, assign to the Employer the benefit of any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.

65.1 No Liability for Special Risks

The Contractor shall be under no liability whatsoever in consequence of any of the special risks referred to in Sub-Clause 65.2, whether by way of indemnity or otherwise, for or in respect of:

(a) destruction of or damage to the Works, save to work condemned under the provisions of Clause 39 prior to the occurrence of any of the said special risks,
(b) destruction of or damage to property, whether of the Employer or third parties, or
(c) injury or loss of life.

65.2 Special Risks

The Special Risks are:

(a) the risks defined under paragraphs (a), (c), (d) and (e) of Sub-Clause 20.4,and
(b) the risks defined under paragraph (b) of Sub-Clause 20.4 insofar as theserelate to the country in which the Works are to be executed.

65.3 Damage to Works by Special Risks

If the Works or any materials or Plant on or near or in transit to the Site, or any of the Contractor's Equipment, sustain destruction or damage by reason of any of the said special risks, the Contractor shall be entitled to payment in accordance with the Contract for any Permanent Works duly executed and for any materials or Plant so destroyed or damaged and, so far as may be required by the Engineer or as may be necessary for the completion of the Works, to payment for:

(a) rectifying any such destruction or damage to the Works, and
(b) replacing or rectifying such materials or Contractor's Equipment,

and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 (which shall in the case of the cost of replacement of Contractor's Equipment include the fair market value thereof as determined by the Engineer) and shall notify the Contractor accordingly, with a copy to the Employer.

65.4 Projectile, Missile

Destruction, damage, injury or loss of life caused by the explosion or impact, whenever and wherever occurring, of any mine, bomb, shell, grenade, or other projectile, missile, munition, or explosive of war, shall be deemed to be a

consequence of the said special risks.

65.5 Increased Costs arising from Special Risks

Save to the extent that the Contractor is entitled to payment under any other provision of the Contract, the Employer shall repay to the Contractor any costs of the execution of the Work (other than such as may be attributable to the cost of reconstructing work condemned under the provisions of Clause 39 prior to the occurrence of any special risk) which are howsoever attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war, but the Contractor shall, as soon as any such cost comes to his knowledge, forthwith notify the Engineer thereof. The Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's costs in respect thereof which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer.

65.6 Outbreak of War

If, during the currency of the Contract, there is an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the Works, the Contractor shall, unless and until the Contract is terminated under the provisions of this Clause, continue to use his best endeavor to complete the execution of the Works. Provided that the Employer shall be entitled, at any time after such outbreak of war, to terminate the Contract by giving notice to the Contractor and, upon such notice being given, the Contract shall, except as to the rights of the parties under this clause and Clause 67, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

65.7 Removal of Contractor's Equipment on Termination

If the Contract is terminated under the provisions of Sub-Clause 65.6, the Contractor shall, with all reasonable dispatch, remove from the Site all Contractor's Equipment and shall give similar facilities to his Subcontractors to do so.

65.8 Payment if Contract Terminated

If the Contract is terminated as aforesaid, the Contractor shall be paid by the Employer, insofar as such amounts or items have not already been covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

(a) the amounts payable in respect of any preliminary items referred to in the Bill of Quantities, so far as the work or service comprised therein has been carried out or performed, and a proper portion of any such items which have been partially carried out or performed;

(b) the cost of materials, Plant or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery, such materials, Plant or goods becoming the property of the Employer upon such payments being

made by him;

(c) a sum being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works insofar as such expenditure has not been covered by any other payments referred to in this Sub-Clause;

(d) any additional sum payable under the provisions of Sub-Clauses 65.3 and 65.5;

(e) such proportion of the cost as may be reasonable, taking into account payments made or to be made for work executed, of removal of Contractor's Equipment under Sub-Clause 65.7 and, if required by the Contractor, return thereof to the Contractor's main plant yard in his country of registration or to other destination, at no greater cost; and

(f) the reasonable cost of repatriation of all the Contractor‟s staff and workmen employed on or in connection with the Works at the time of such termination.

Provided that against any payment due from the Employer under this Sub-Clause, the Employer shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of Contractor's Equipment, materials and Plant and any other sums which, at the date of termination, were recoverable by the Employer from the Contractor under the terms of Contract. Any sums payable under this Sub-Clause shall, after due consultation with the Employer and the Contractor, be determined by the Engineer who shall notify the Contractor accordingly, with a copy to the Employer.

67.1 Engineer's Decision

If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the eighty-fourth day after the day on which he received such reference the Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause

67.2 Amicable Settlement

Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 67.1, the parties shall attempt to settle such dispute amicably before the commencement of arbitration. Provided that, unless the parties otherwise agree, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of intention to commence arbitration of such dispute was given, even if no attempt at amicable settlement thereof has been made.

67. 3 Arbitration

In the sixth to eight lines, the words "shall be finally settled.....appointed under such Rules" are deleted and substituted with the following:

shall be finally settled under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force.

The following paragraph is added:

The place of arbitration shall be....., Pakistan.

67.4 Failure to Comply with Engineer's Decision

Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 67.1 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any otherrights it may have, refer the failure to arbitration in accordance with Sub-Clause 67.3. The provisions of Sub-Clause 67.1 and 67.2 shall not apply to any such reference.

68.1 Notice to Contractor

The following paragraph is added:

For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.

68.2 Notice to Employer and Engineer

For the purposes of this Sub-Clause, the respective addresses are:

a) The Employer: Sukkur IBA University

…….....
(to be filled in by the Employer as appropriate)

b) The Engineer: Project Director/Project Coordinator

…….....
(to be filled in by the Employer as appropriate)

69.1 Default of Employer

In the event of the Employer:

(a) failing to pay to the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract,

(b) interfering with or obstructing or refusing any required approval to the issue of any such certificate,

(c) becoming bankrupt or, being a company, going into liquidation, other than for the purpose of a scheme of reconstruction or amalgamation, or

(d) giving notice to the Contractor that for economic reasons it is impossible for him to continue to meet his contractual obligations,

the Contractor shall be entitled to terminate his employment under the Contract by giving notice to the Employer, with a copy to the Engineer. Such termination shall take effect 14 days after the giving of the notice.

69.2 Removal of Contractor's Equipment

Upon the expiry of the 14 days' notice referred to in Sub-Clause 69.1, the

Contractor shall, notwithstanding the provisions of Sub-Clause 54.1, with all reasonable dispatch, remove from the Site all Contractor's Equipment brought by him thereon.

69.3 Payment on Termination

In the event of such termination the Employer shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of Clause 65, but, in addition to the payments specified in Sub-Clause 65.8, the Employer shall pay to the Contractor the amount of any lossor damage to the Contractor arising out of or in connection with or by consequence of such termination.

70.1 Increase or Decrease of Cost

Sub-Clause 70.1 is deleted in its entirety, and substituted with the following:

The amounts payable to the Contractor, pursuant to Sub-Clause 60.1, shall be adjusted in respect of the rise or fall in the cost of labor, materials, and other inputs to the Works, by applying to such amount the formula prescribed in this Sub-Clause.

(a) Other Changes in Cost

To the extent that full compensation for any rise or fall in costs to the Contractor is not covered by the provisions of this or other Clauses in the Contract, the unit rates and prices included in the Contract shall be deemed to include amounts to cover the contingency of such other rise or fall of costs.

(b) Adjustment Formula

The adjustment to the monthly statements in respect of changes in cost shall be determined from the following formula:-

$$Pn = A + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + \ldots\ldots\ldots\ldots\ldots$$

Where:

Pn is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Paragraph 60.1 (a), and with Paragraphs 60.1 (b) and (e), where any variations and day work are not otherwise subject to adjustment;

A is a constant, specified in Appendix-C to Bid, representing the nonadjustable portion in contractual payments;

b, c, d, etc., are weightages or coefficients representing the estimated proportion of each cost element (labor, cement and reinforcing steel etc.) in the Works or Sections thereof, net of Provisional Sums and Prime Cost; the sum of A, b, c, d, etc., shall be one;

Ln, Mn, En, etc., are the current cost indices or reference prices of the cost elements

for month "n", determined pursuant to Sub-Clause 70.1(d), applicable to each cost element; and

Lo, Mo, Eo, etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 70.1(d).

(c) Sources of Indices and Weightages

The sources of indices shall be those listed in Appendix-C to Bid, as approved by the Engineer. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightages and Source of Indices if different than those given in Appendix-C to Bid, which shall be subject to approvalby the Engineer.

(d) Base, Current, and Provisional Indices

The base cost indices or prices shall be those prevailing on the day 28 days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing on the day 28 days prior to the last day of the period to which a particular monthly statement is related. If at any time the current indices are not available, Provisional indices as determined by the Engineer will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available.

(e) Adjustment after Completion

If the Contractor fails to complete the Works within the Time for Completion prescribed under Clause 43, adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating to the prescribed time for completion, or the current indices or prices, whichever is more favorable to the Employer, provided that if an extension of time is granted pursuant to Clause 44, the above provision shall apply only to adjustments made after the expiry of such extension of time.

(f) Weightages

The weightages for each of the factors of cost given in Appendix-C to Bid shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced, or inapplicable as a result of varied or additional work executed or instructed under Clause 51. Such adjustment(s) shall have to be agreed in the variation order.

The following Sub-Clauses 73.1, 73.2, 74.1, 75.1, 76.1, 77.1and 78.1 are added:

72.1 Rates of Exchange

Where the Contract provides for payment in whole or in part to be made to the Contractor in foreign currency or currencies, such payment shall not be subject to variations in the rate or rates of exchange between such specified foreign currency or currencies and the currency of the country in which the Works are to be

executed.

72.2 Currency Proportions

Where the Employer has required the Tender to be expressed in a single currency but with payment to be made in more than one currency and the Contractor has stated the proportions or amounts of other currency or currencies in which he requires payment to be made, the rate or rates of exchange applicable for calculating the payment of such proportions or amounts shall, unless otherwise stated in Part II of these Conditions, be those prevailing, as determined by the Central Bank of the country in which the Works are to be executed, on the date28 days prior to the latest date for the submission of tenders for the Contract, as has been notified to the Contractor by the Employer prior to the submission of tenders or as provided for in the Tender.

72.3 Currencies of Payment for Provisional Sums

Where the Contract provides for payment in more than one currency, the proportions or amounts to be paid in foreign currencies in respect of Provisional Sums shall be determined in accordance with the principles set forth in Sub-Clauses 72.1 and 72.2 as and when these sums are utilized in whole or in part in accordance with the provisions of Clauses 58 and 59.

73.1 Payment of Income Tax

The Contractor, Subcontractors and their employees shall be responsible for payment of all their income tax, super tax and other taxes on income arising out of the Contract

and the rates and prices stated in the Contract shall be deemed to cover all such taxes.

73.2 Customs Duty & Taxes

(Employer may incorporate provisions where applicable)

74.1 Integrity Pact

If the Contractor or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Appendix-L to his Bid, then the Employer shall be entitled to:

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

(b) terminate the Contract; and

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

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 63.1 to 63.4 and the payment under Sub-Clause 63.3 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.

75.1 Termination of Contract for Employer's Convenience

The Employer shall be entitled to terminate the Contract at any time for the Employer's convenience after giving 56 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor:

(a) shall proceed as provided in Sub-Clause 65.7 hereof; and

(b) shall be paid by the Employer as provided in Sub-Clause 65.8 hereof.

76.1 Liability of Contractor

The Contractor or his Subcontractors or assigns shall follow strictly, all relevant labor laws including the Workmen's Compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute between the Contractor, his Subcontractors or assigns and the labour employed by them.

77.1 Joint and Several Liability

If the Contractor is a joint venture of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

78.1 Details to be Confidential

The Contractor shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Employer or the Engineer. If anydispute arises as to the necessity of any publication or disclosure for the purpose of the Contract, the same shall be referred to the decision of the Engineer whose award shall be final.

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SECTION
SITE CLEARING

PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Removal and disposal of vegetation, brush, rubbish, loose rocks, large stones and metallic debris occurring within the areas to be cleared as well as removal of roots, matted roots and organic materials to a depth of not less than 300 mm below original surface level of ground or to natural rock elevation.

B. Removal and satisfactory disposal of any structure that obtrude, encroach upon, or otherwise obstruct the Work indicated on Drawings.

C. Remove, Dismantle and satisfactory disposal of concrete foot path, masonry works, metalled roads, electric pools, wiring and all types of flooring, superstructure etc. within the site limit.

1.2. JOB CONDITIONS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities. Do not use facilities without permission from the Engineer or authorities having jurisdiction.

B. Protection of Existing Improvements (If required): Provide protection as necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect improvements on adjoining properties and on Owner's property.
2. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

2.1. SITE CLEARING

A. General: Remove trees, shrubs, grass and other vegetation, improvements or obstructions interfering with the execution of the new construction. Remove such items elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots.

B. Clearing and Grubbing: Remove material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes to a depth of not less than 300 mm below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this Contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface in conformance with the original adjacent surface of the ground.

C. Removal of Improvements: Remove existing above-grade and below-grade improvements necessary to permit construction and other works as indicated on drawings.

2.2. DISPOSAL OF WASTE MATERIALS

A. Transport waste materials and unsuitable topsoil materials to the designated spoil areas and dispose of as directed by the Engineer at no extra cost.

B. Dust Control: Amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions.

2.3. BURNING

A. Use of burning at the Project Site for the disposal of refuse and debris shall not be permitted.

2.4. USE OF EXPLOSIVES

A. Use of explosives shall not be permitted.

END OF SECTION

SECTION
EARTHWORK

PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Excavation, filling, and compacting as well as site grading as shown on Drawings and as specified herein.

1.2. REFERENCES

A. ASTM - American Society for Testing and Materials

ASTM D 422	Particle Size Analysis of Soils
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-inch (305-mm) Drop
ASTM D 1556	Density of Soil-in-Place by the Sand-Cone Method
ASTM D 1557	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop
ASTM D 2167	Density and Unit Weight of Soil-in-Place by the Rubber Balloon Method
ASTM D 2216	Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil-Aggregate Mixtures
ASTM D 2487	Classification of Soils For Engineering Purposes
ASTM D 2937	Density of Soil in Place by the Drive-Cylinder Method
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4253	Maximum Index Density of Soils Using Vibratory Table
ASTM E 548	Standard Guide for General Criteria Used for Evaluating Laboratory

B. AASHTO - American Association of State Highway and Transportation Officials

AASHTO M 145	Classification of Soils and Soil-Aggregate Mixtures For Highway Construction Purposes
AASHTO T 180	Moisture-Density Relations of soils using a 10 lb (4.54 kg) Rammer and an 18 inch (457 mm) Drop
AASHTO T 191	Test Method for In-Place Density of Compacted Base Courses Containing Large Sizes of Coarse Aggregate

1.3. SUBMITTALS

A. Test Reports (Excavating, Filling and Grading):

1. Submit copies of the following reports:

a. Test reports on soil material conforming to the requirements specified under Quality Assurance.

b. Field density test reports.

c. One optimum moisture-density relationship curve for each type of soil to be used for fill or backfill.

B. Excavations over 1.5 m in depth will be sheeted and shored. Submit drawings and calculations for the design of the sheeting and shoring.

1.4. QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of Uniform Building Code (UBC) and other governing authorities, codes and standards having jurisdiction.

B. Testing Services: Employ a qualified independent testing laboratory approved by the Engineer to perform tests specified herein during earthwork operations as well as the additional tests performed to determine the quality of work, if requested by the Engineer at no extra cost. Perform each test in conformance with the following:

- Compaction Curve: Conform to ASTM D 1557
- Liquid Limit: Conform to ASTM D 4318
- Plastic Limit: Conform to ASTM D 4318
- In-Situ Moisture Content: Conform to ASTM D 2216
- Particle-Size Analysis: Conform to ASTM D 422
- Soil Classification: Conform to ASTM D 2487

C. Quality Testing Compliances: Based on reports of the testing and inspection, if the subgrade, fill, or backfill does not meet the specified requirements these materials shall be considered defective and shall be rejected. Excavate rejected materials and provide new acceptable materials replacing the rejected materials and re-compact the new materials as specified. Retest the re-compacted materials and repeat the procedure as necessary until the specified compaction is obtained.

D. Recommendations of Report for Geo-Technical Studies for the Project shall be followed.

1.5. JOB CONDITIONS

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil bore holes. It should be expressly understood that the Engineer would not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data are made available for the convenience of Contractor. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Noise and Dust Control: Utilize reasonable and necessary means to abate dust, dirt rising, and undue noise. Perform necessary sprinkling and wetting of construction site to prevent dust from spreading.

C. Existing Utilities:

1. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

2. Should uncharted or incorrectly charted, piping or other utilities be encountered during excavation; consult the corresponding utility company for directions. Cooperate with the Engineer and utility companies in keeping the respective services and facilities in operation. Repair damaged utilities to the satisfaction of the authorized utility company.

D. Use of Explosives:

1. The use of explosives shall not be permitted.

E. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by the authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

F. Existing Conditions: Prior to commencing work at site, verify agreement of existing conditions with indicated conditions. Notify the Engineer in writing of discrepancies found. Start of work without notification constitutes acceptance of conditions, with no extra cost.

PART 2 - PRODUCTS

2.1. SOIL MATERIALS

A. Backfill and Fill Materials:

1. Suitable Materials:

a. Materials classified according to ASTM D 2487 as GW, GP, GM, SM, SW and SP, or a combination of these group symbols; free of rock or gravel larger than 75 mm in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

b. Materials conforming to AASHTO M 145 Class A-1, A-2 or A-3.

c. Lime and fly-ash when used as stabilizing agents.

2. Unsuitable Materials:

a. Materials conforming to ASTM D 2487 class CH, CL, MH, PT, OH and OL, or a combination of these group symbols.

b. Materials that are not defined above as suitable materials.

3. Fill materials shall be free of rock or gravel larger than 75 mm in any dimension, debris, waste, organic material and other deleterious matter. The fine content (silt and clay size particles passing US # 200 sieve which is equivalent to a particle diameter of 75 micron) should be less than 15 % by weight. Fill materials shall have a grading with

100% passing the 3/8 inch (9.5 mm) sieve. Follow the recommendations of Report for Geo-Technical Studies.

B. Acceptable Topsoil: Acceptable topsoil includes selectively excavated topsoil material that is representative of local soils that produce heavy growths of crops, grass, or other vegetation, and is reasonably free from underlying subsoil, clay lumps, weeds, litter, brush, matted roots, toxic

substances, or any material harmful to plant growth or which would hinder grading, planting, or maintenance operations. Topsoil shall not contain more than 5 percent by volume of stones or other such objects larger than 25 mm in any dimension for field-seeded areas and 12 mm in any dimension for lawn seeded areas.

C. Borrow Material: Where suitable materials are not available in sufficient quantities from required excavations, approved materials shall be obtained from approved sources outside the limits of project at the Contractor's expense. Borrow material shall comply with the requirements specified for **Backfill and Fill Materials**. Borrow material shall be subject to the Engineer's approval based on the test reports performed as described herein.

D. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (38-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve. Thickness of drainage layer shall be as shown on drawings.

E. Sub-Base Materials: AASHTO M 147 Grade B naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.

2.2. EXCAVATED MATERIALS

A. Excavated materials shall not be used for fill under structures and pavements, unless indicated otherwise in Geotechnical Report. Follow the recommendations of Report for Geo-Technical Studies. Excavated materials may be used for general fill after removing oversize stones, unless indicated otherwise in Geotechnical Report.

PART 3 - EXECUTION

3.1. EXCAVATION

A. Excavate materials of whatever nature encountered to the lines and grades as shown. Excavation includes removal and disposal of obstructions on ground surface, underground structures and other materials encountered.

B. Unauthorized Excavation: Consists of the removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation shall be at the Contractor's expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom without altering required top elevation.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations unless otherwise directed by the Engineer.

C. Additional Excavation: When excavation has reached required subgrade elevations, the Engineer will make an inspection of conditions.

1. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper 300 mm and replace the excavated material with specified sub-base materials and as directed by the Engineer.

2. In areas of unsuitable material where over excavating to 300 mm does not remove the unsuitable bearing material, excavate down as required and construct a working platform using specified sub-base materials for 300 mm in depth then use rockfill material. Bring backfill to 300 mm below the finished subgrade shown on Drawings in layers not

exceeding 200 mm in depth. Continue backfilling to subgrade elevation or to final elevation using specified backfill material as shown on Drawings.

D. Stability of Excavations: Slope sides of excavations to comply with the following:

1. Slopes of cuts in natural; 1:1

2. Slopes of compacted fill; 1-1/2:1

3. Slopes of uncompacted fill; 2:1

Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

E. Shoring and Bracing: Designing, providing and maintaining the suitable shoring and bracing system that will support the loads imposed shall be the Contractor's responsibility. Proposed shoring and bracing system shall be subject to approval of the Engineer. Provide materials for shoring and bracing in good serviceable condition.

1. Provide shoring system adequately anchored and braced to resist earth and hydroscopic pressures.

2. Establish requirements for trench shoring and bracing to comply with safe operating procedures.

3. Maintain shoring and bracing in excavations. Carry down shoring and bracing as excavation progresses.

F. Dewatering: Provide adequate dewatering system in order to prevent surface water and subsurface or ground water from flowing into excavations and from flooding Project site and the surrounding area:

1. Designing, providing and maintaining comprehensive dewatering system throughout excavation and backfilling works. Proposed dewatering system shall be subject to approval of the Engineer. However, such approval shall not relieve Contractor from his responsibility towards the dewatering system. In case, Contractor's proposed dewatering system fails or does not perform efficiently, Contractor shall immediately replace the system at no extra cost to Owner.

2. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Dewatering system shall run 24 hours a day during excavation and backfilling works. Contractor shall provide standby power generators for running the dewatering system, non-stop, in case of power failures.

3. Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

G. Material Storage: Stockpile suitable excavated material until required for backfill or fill. Locate and retain soil materials away from edge of excavations. Dispose off excess soil material and waste materials.

H. Excavation for Structures:

1. Conform to elevations and dimensions shown within a tolerance plus or minus 50 mm and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services and other construction as well as for inspection.

2. In excavating for footings and foundations, take care not to disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive concrete.

I. Excavation for Trenches: Conform to the requirements of Section 02225 - TRENCHING AND BACKFILLING.

3.2. BACKFILL AND FILL

A. General: Place soil material in layers to the required subgrade elevations, for each area classification listed below, using materials as specified above.

1. General Fill: Use satisfactory excavated or borrowed material.

2. Under Structures: Use satisfactory excavated or borrowed material.

3. Under Grassed Areas: Use satisfactory excavated or borrowed material.

4. Under Walkways and Pavements: Use subbase material, satisfactory excavated or borrow material, or a combination.

5. Under Steps: Use subbase material.

6. Under Building Slabs: Use drainage fill material.

7. Under Equipment: Use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.

8. Trenches for Piping and Conduits: Conform to the requirements of Section 02225 - TRENCHING AND BACKFILLING.

H. Backfill excavations as promptly as work permits, but not until the completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, water-proofing and perimeter insulation.

2. Inspection, testing, approval and recording locations of underground utilities have been performed and recorded.

3. Removal of concrete formwork.

4. Removal of trash and debris from excavation.

5. or temporary horizontal bracing is in place on horizontally supported walls.

3.3. PLACEMENT AND COMPACTION

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip,

or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface to depth of 300 mm and compact to required depth as directed by the Engineer.

B. Place backfill and fill materials in layers not more than 200 mm in loose depth for material compacted by heavy compaction equipment and not more than 100 mm in loose depth for material compacted by hand-operated tampers.

C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy.

D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by the Engineer if soil density tests indicate inadequate compaction.

F. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:

1. Under structures, building slabs and steps, and pavements, compact top 300 mm of subgrade and each layer of backfill or fill material at 95 percent maximum density.

2. Under lawn or unpaved areas, compact top 150 mm of subgrade and each layer of backfill or fill material at 90 percent maximum density.

3. Under walkways, compact top 150 mm of subgrade and each layer of backfill/fill material at 95 percent maximum density.

4. General Fill: Compact each layer of backfill or fill material at 90 percent maximum density.

G. Moisture control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations. Moisture content shall be kept within 2 percent above or below the optimum as determined by ASTM D 1557, Method-D.

H. Unless otherwise approved by The Engineer, heavy equipment for spreading and compacting backfill shall not be operated closer to a wall less than a distance equal to the height of the backfill above the top of footing; the area remaining shall be compacted in layers not more than 150 mm in compacted thickness with power driven hand tamper suitable for material being compacted.

I. Testing of Fill and Backfill: Frequency of field density tests in accordance with ASTM D 1556 (Sand Cone Method) shall be as follows:

1. One test per 30 m^2 of underground pipe trench.
2. One test per 100 m^2 per lift under foundations.
3. One test per 200 m^2 per lift under paved areas.
4. The laboratory tests ASTM D 698 shall be carried out once for every 5 field density tests.

J. Tolerance:

1. Pavements and Walks: Shape surfaces of areas under pavement and walks to line, grade cross-section with finish surface not more than 20 mm above or below the required subgrade elevation.

2. Under Building Slabs: Provide final grades within a tolerance of 12 mm when tested in a 3 m straight edge.

3. Footing: Finish surfaces on which footing shall be placed to within 25 mm or below the required grades.

4. Landscaped Areas and Rough Grading: Finish all areas to within 50 mm above or below the elevations, grades and cross-sections shown.

3.4. BUILDING SLAB DRAINAGE COURSE

A. Placing: Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations. When a compacted drainage course is indicated to be 150 mm thick or less, place material in a single layer. Where thickness of drainage course is indicated to be more than 150 mm, place material in equal layers, not more than 150 mm or less than 75 mm thick for each layer when compacted.

3.5. PREPARATION FOR PAVEMENTS

A. Sub-Grade Preparation:

1. After completion of stripping or excavation operations, as applicable, scarify and compact the natural sub-grade to lines, slopes and levels as shown on the Drawings.

2. The top 300 mm of sub-grade shall be compacted to a minimum density of 95 percent. Density shall be measured in field in accordance with AASHTO T 191 and in the laboratory shall be determined according to AASHTO T 180.

B. Granular Sub-Base:

1. General: For granular sub-base; before placing and spreading operations are started, verify that the sub-grade has been approved and satisfactorily maintained and that it is to levels and of the material specified. Ruts or soft yielding areas shall be filled and compacted to the required density.

2. Placing and Compaction: Sub-base material shall be spread on the finished sub-grade in uniform layer without segregation, to such loose depth that when compacted the layer will have a thickness of maximum 200 mm. Material shall be mixed with blade graders or other equipment until a uniform mixture is obtained. Aggregate shall be within the specified moisture content limits when compacting is started. Variations shall be corrected prior to or during compacting by sprinkling or by aeration. The layer shall be compacted by rolling with a 3-wheel power roller weighing 8 to 10 tons or an approved pneumatic roller. Alternate blading and rolling shall be performed until obtaining smooth, even and uniformly compacted finished top course.

C. Compacting shall not be less than 100 percent of maximum dry density in place for access roads and 95 percent minimum for parking areas. Density shall be measured in field according to AASHTO T 191 and in laboratory shall be determined in accordance with AASHTO T 180. The C.B.R. value of the granular sub-base course after compacting shall be more than 50 percent.

D. Testing Surface: Sub-base shall be true to established grade. Thickness shall not be more or less than 10 mm from that required for the layer being constructed. Surface shall not vary more than 10 mm in 3 m from true profile and cross-section. Thickness of the granular sub-base shall be measured at intervals as directed by the Engineer. Measurements shall be taken at various points through holes not less than 75 mm in diameter.

3.6. MAINTENANCE

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris and provide temporary drainage as required.

2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required moisture and density prior to further construction. Remove saturated or softened soil as directed by the Engineer.

SECTION
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Trench excavation.

B. Backfilling.

C. Removal and disposal of excess excavation materials as well as importing the required bedding and fill materials if necessary.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials

ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-inch (305 mm) Drop
ASTM D 1556	Test Method for Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-inch (457 mm) Drop
ASTM D 1559	Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 4253 Test Methods for Maximum Index Density of Soils Using Vibratory Table

ASTM D 4254 Test methods for Minimum Index Density of Soils and Calculation of Relative Density

1.3 SUBMITTALS

B. Submit test reports of backfilling materials and compaction showing compliance with the requirements specified herein.

C. Submit field density test reports.

D. Submit one optimum moisture-density relationship curve for each type of soil to be used for fill or backfill.

1.4 HAZARDS

A. Whenever the Engineer determines that excavation or fill on Owner's property which was created by a Contractor and which is a hazard to life and limb, or endangers property, or adversely affects the safety, use or stability of a roadway or drainage channel, the responsible Contractor, upon receipt of a notice in writing from the Engineer, shall within the period specified therein repair or eliminate at his own expense such excavation or fill so as to eliminate the hazard occurring.

1.5 DEFINITIONS

B. Bedding Material: Materials utilized for bedding under pipes in trenches.

C. Initial Backfill Material: Materials utilized for backfilling around pipes 150 mm above the top of pipe.

D. Unsuitable Materials:

1. Materials including, but not limited to, silts or clays containing organic materials, soils containing large amounts of roots, grasses, and other vegetation, debris, decomposable materials or as identified by the Engineer.

2. Materials consisting of gypsum, salt deposits, and clayey marl with plasticity index in excess of 20.

PART 2 PRODUCTS

0.1 MATERIALS

E. Clean Sand:

3. Soil material meeting the following gradation containing less than 3 percent weight of organic material, marl or clay:

Sieve Size	Percent Passing
1/4 inch (6.25 mm)	100
No. 10 (2.00 mm)	90 - 100
No. 20 (0.075 mm)	10 or less

F. Marl: A wide variety of inorganic calcareous soil materials which may vary from clay to gravel

sizes and may include cobble and boulder sized pieces.

2.2 BEDDING MATERIALS

A. Provide clean sand conforming to the gradation and requirements specified herein.

B. Compact sand bedding to at least 70 percent relative density, or 95 percent proctor density according to ASTM D 698 whichever is applicable and gives greater density.

C. Determine maximum/minimum densities of a representative bedding sample according to ASTM D 4253/ASTM D 4254 for all locations. Obtain field density in accordance with ASTM D 1556, Sand-Cone Method.

2.3 INITIAL BACKFILL MATERIALS

A. Provide clean sand conforming to the gradation and the requirements specified herein.

B. Compact clean sand to 70 percent relative density from the bottom of pipe to 150 mm above the top of pipe. Maximum lifts of 150 mm are recommended.

2.4 FILL MATERIALS

A. Provide marl or soil materials for backfill from 150 mm above the top of pipe to the top of trench meeting the following requirements:

4. Not more than 3 percent organic or decomposable materials.

5. No debris.

6. A maximum particle size of 150 mm or one-half the lift thickness, whichever is smaller.

7. Minimum compaction shall be in accordance with the following Table:

	Non-Traffic Areas	Motor Vehicle Traffic Areas	Highways with Heavy Truck Traffic
Non-Cohesive Soils (Sand)	65% relative density*	70% relative density*	85% relative density*
Cohesive Soils	85% of maximum density**	95% of maximum density**	95% of maximum density***

* Relative Density: Determined in accordance with ASTM D 4253 and ASTM D 4254.

** Maximum Density: Determined in accordance with ASTM D 698.

*** Maximum Density: Determined in accordance with ASTM D 1557.

8. Compact backfill materials to densities specified in accordance with ASTM D 4253 and ASTM D 4254 or ASTM D 698 whichever is applicable and gives the greater density.

2.5 WARNING TAPE

A. Warning Tape: Metallic core polyethylene color-coded type, 150 mm wide, 100 micron thick.

PART 3 EXECUTION

3.1 GENERAL

B. Unclassified Excavation: Perform excavation as indicated on Drawings in whatever material encountered.

C. Unsuitable Materials:

1. Excavate materials designated as unsuitable for use as fill by the Engineer until suitable material is found.

2. Remove and dispose off site materials excavated during trenching, which is unsuitable for backfill at no extra cost.

3.2 TRENCH EXCAVATION

D. Excavate trenches to the width and depth required and establish the indicated invert elevations.

E. Saw cut asphalt and concrete pavement providing a minimum of 100 mm beyond the required trench including allowances for sheeting and other works, or to a total width of 1 m, whichever is greater.

F. Trench Dewatering: Conform to the requirements of Section 02200 - EARTHWORK. If trench dewatering is necessary, no construction shall start until the approval of design of dewatering system by the Engineer. Dewatering systems shall not discharge into existing sewers, completed sections of new sewers, or into open surface areas. Trench bottom shall be dry before pipe installation. Cap the end of pipes between shifts and weight the pipe to prevent floating.

G. Trench bottom shall be continuous, smooth, free of rocks, and to the lines and grades shown on Drawings. Shape trench beds at joint locations to accommodate the larger outside diameter of joint, so as to provide a continuous support for the pipe. Trench contour shall not cause joint angular deflection or pipe bending radius exceeding the Manufacturer's limit.

H. Depth of trench shall allow a minimum of 150 mm of sand bedding below the pipe. Remove a minimum of 300 mm of unstable soil and replace with a minimum of 150 mm of crushed stone, maximum size of 38 mm (1-1/2 inch) and 150 mm of sand on top of stone.

I. Sheeting or Shoring: Conform to the requirements of Section 02200 - EARTHWORK.

J. Unless live loads, dead loads, pipe deflections, and pipe stresses are calculated by a method acceptable to the Engineer to verify the adequacy of pipe with less cover, and unless Manufacturer's recommendation require deeper burial, the minimum cover over the top of pipe shall be as shown on Drawings and approved by the Engineer.

3.3 BEDDING

A. Provide clean sand bedding, 150 mm thick for trench bottom. Tamp or Compact sand bed to provide uniform bearing.

3.4 BACKFILLING

A. Place the initial backfilling materials in maximum lifts of 150 mm around pipes and to 150 mm above the top of pipes.

B. Compact backfill to the corresponding densities specified above. Within 300 mm of the pipe, backfill shall be hand tamped, or a board shall be used to protect pipe damage from vibratory plate compactors.

C. Sheeting and Shoring:

1. Remove sheeting and shoring gradually as the backfill is placed. Fill voids under and behind sheeting as sheeting is withdrawn.

2. Cut and leave sheeting in place, where in the opinion of the Company Representative, damage to the pipe may occur.

D. Exceptions:

1. Backfill trenches with concrete where trench excavations pass within 450 mm of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing. Backfill trenches after completion of tests and inspections and the Engineer approval. Backfilling shall not damage or displace piping systems.

2. Provide 100 mm thick concrete base slab support for piping or conduits less than 750 mm below surface of roadways. After installation and testing of piping or conduits, provide 100 mm thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.

3.5 COMPACTION TESTING

A. Test Method: To verify that the specified degree of compaction has been achieved, perform in-place density tests by the nuclear method conforming to ASTM D 1556 and ASTM D 2922.

B. Frequency: Perform compaction tests after the compaction of each lift of fill, at a minimum rate of one in-place density test for every 50 linear meters of compacted soil. Spacing between test locations shall be approximately equal.

C. Extra Test: When test results fail to meet the established criteria for testing, perform the remedial Work to the satisfaction of the Engineer. Re-test the repeated Work using same methods and procedures specified herein to confirm achieving the required established criteria.

3.6 WARNING TAPE

A. Place warning tape over utility lines in trenches and to the depths shown on Drawings.

3.7 PAVEMENT REINSTATEMENT

A. Asphalt Concrete Paving: Conform to the requirements of Section 02510 - ASPHALT CONCRETE PAVING.

B. Pavement base course shall be of the same depth and material as the original base course.

C. Prime edges of the existing pavement and base course.

D. Surface course shall be identical to the original surface course.

E. Roll the paved patch in both directions with a 5-ton roller so as to compact the patch to 96 percent of Marshall density in accordance with ASTM D 1559.

END OF SECTION

SECTION
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete as indicated on Drawings and as specified herein.

1.2 REFERENCES

A. ACI - American Concrete Institute:

ACI 301 Specifications for Structural Concrete for Buildings

ACI 318 Building Code Requirements for Reinforced Concrete

ACI 347 Recommended Practice for Concrete Formwork (ANSI A145.1)

B. APA - American Plywood Association:

APA High Density Overlaid Concrete Form, Class 1

APA Structural 1, Exterior Quality, Class 1

APA Plastic Overlaid Plywood Forms

C. ANSI - American National Standard Institute:

A199.1 Construction and Industrial Plywood

1.3 SUBMITTALS

A. Product's Data: Submit manufacturer's specifications and installation instructions for proprietary materials and items as required, including form coatings, manufactured form systems, ties and accessories.

B. Detail Shop Drawings: Submit data on sequence of the concrete placement, location of construction joints, camber details, bearing values of the soils supporting false-work under wet and dry conditions, the anticipated settlements as well as false-work release sequence.

1.4 QUALITY ASSURANCE

A. Design, construct, erect, support, brace, maintain and remove forms according to ACI 318, Parts 1, 2, and 3 requirements as well as ACI 347 requirements for loads, lateral pressure and allowable stresses; in addition to other design parameters such as wind loads.

1. Construction: Construct formwork so that cast concrete surfaces will conform to the requirements of ACI 301, Chapter 4, Paragraph 4.3 Tolerances.

2. Hydraulic Pressure: Maximum allowable deflection of forming surfaces from concrete pressure will be length/360 between supports.

3. Provide surveys as required to check the lines and levels of the completed formwork for exposed concrete before concrete is placed. Make the required corrections or adjustments to formwork to correct deviations which exceed the specified tolerances.

4. Check formwork during concrete placement to ensure forms, shores, false-work, ties and other features have not been unduly disturbed by concrete placement methods or equipment. Report in writing to the Engineer deviations from the allowable tolerances.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Formwork:

1. Unless otherwise specified construct formwork of plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to Engineer to provide continuous, straight, smooth surfaces. Provide formwork in the largest practice sizes to minimize number of joints and to conform to joint system indicated on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection. Provide wood forms of minimum thickness of 16 mm.

2. Use overlaid plywood complying with U.S. Product Standard PS-1, A-C or B-B High Density Overlaid Concrete Form, Class 1.

B. Forms of Unexposed Finish Concrete: Provide forms of plywood, lumber, metal or glass-fiber reinforced plastic or other acceptable material.

C. Form Ties:

1. Provide factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal. Use Plastic cone type, with threaded steel rod. For water tanks or other water retaining structures use watertight form ties as recommended by the manufacturer.

2. Unless otherwise indicated, provide ties so that portion remaining within concrete after removal of exterior parts is at least 38 mm from the outer concrete surface. Provide form ties which will not leave a hole larger than 25 mm diameter in the concrete surface.

3. Form ties fabricated on Project Site and wire ties are not acceptable.

D. Form Release: Non-staining, non-reactive, rust-preventive guaranteed not to affect bond of subsequent surface applications to concrete.

2.2 DESIGN OF FORMWORK

A. Design, erect, support, brace and maintain formwork to safely support vertical and lateral loads applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for the purpose. Design and construct formwork of concrete members and structures to correct size, shape, alignment, elevation and position.

B. Design form and false-work to include assumed value of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability and other factors pertinent to safety of structure during construction.

C. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

D. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide back-up material at joints as required to prevent leakage and fins.

E. Design forms according to ACI 318, Parts 1, 2, and 3 requirements as well as ACI 347 requirements for loads, lateral pressure, and allowable stresses; in addition to other design parameters.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrate and conditions under which concrete formwork is to be performed. Correct any unsatisfactory conditions. Proceed with the work after unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

3.2 FORM CONSTRUCTION

A. General:

1. Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions indicated and required to obtain accurate alignment, location, grades, level and plumb work in the finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustication, reglets, chamfers, blocking, screed, bulkheads, anchorages, inserts, and other features required. Use selected materials to obtain the required finishes.

2. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

3. Provide temporary openings where interior area of formwork is inaccessible for cleanout, inspection before concrete placement and placement of concrete. Securely brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

4. Form intersecting planes to provide true, clean-out corners, with edge grain of plywood not exposed as form for concrete.

B. False-work:

1. Erect false-work and support, brace and maintain it to safely support vertical, lateral and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct false-work so that adjustments can be made for take-up and settlement.

2. Provide wedges, jacks or camber strips to facilitate vertical adjustment. Inspect false-work and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure and make necessary adjustments to produce work of required dimensions.

3. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores cannot be secured.

4. Support form facing materials by structural members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to an accurate alignment, free from irregularities and within allowable tolerances. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads for long span members without intermediate supports.

5. Provide temporary openings in wall forms and at other locations necessary to permit inspection and clean-out.

C. Forms for Exposed Concrete:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.

2. Do not use metal cover plates for patching holes or defect in forms.

3. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.

4. Use extra studs and bracing as required to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.

5. Assemble forms in a way to be readily removed without damage to exposed concrete surfaces.
6. Form moldings shapes, recesses and projections with smooth finish materials and install in forms with sealed joints to prevent displacement.

D. Corner Treatment:

1. Form exposed corners to produce square, smooth, solid, unbroken lines, except as otherwise indicated.

2. Provide chambers for surfaces where indicated on Drawings.

3. Unless otherwise indicated, form chamfers using wood strips 19 x 19 mm; accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.

E. Control Joints: Locate control joints where indicated or as directed. Refer to Section 03300 - CAST-IN-PLACE CONCRETE for control and construction joints treatment.

F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases required for such work. Accurately place and securely support built-in items into forms.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete placement. Re-tighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.3 FORM COATINGS

A. Coat form contact surfaces with form-coating compound before placing the reinforcement. Provide form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

B. Coat steel forms with a non-staining, rust-preventive form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by the suppliers of these items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screed required.

C. Metal Inserts:

1. Provide metal inserts for anchorage of materials or equipment to concrete construction, as required for the work.
2. Provide adjustable wedge inserts of malleable cast iron, complete with bolts, nuts and washers; 19 mm bolt size unless otherwise indicated.
3. Provide threaded inserts of malleable cast iron, furnish complete with full-depth bolts; 19 mm bolt size, unless otherwise indicated.
4. Provide box-out sections in concrete work as required for installation of equipment or other work.
5. Coordinate location of all required embedded weld plates and other items for attachment of precast concrete to cast-in-place concrete.

3.5 SHORES AND SUPPORTS

A. Shore floor directly under slab being placed so that loads from construction above will safely transfer directly to these shores. Space out shoring below this level in such a manner that no member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimum if required to ensure the proper distribution of loads and the safety of all concrete members.

B. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete, and to assure that the structure supported is not subjected to impact or loading eccentricities. Locate and provide adequate reshoring to safely support the work.

3.6 REMOVAL OF FORMS

A. Formwork not supporting concrete, such as sides of beams, columns, walls, and similar parts of the work (vertical faces) may be removed not less than 24 hours after placing concrete provided that concrete is sufficiently hard and will not be damaged by form removal operations, and provided that curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as slabs and other structural elements must remain in place for the time period shown in ACI 347, Section 3.6.2.3 (assuming design live load is less than dead load) and until concrete has attained design minimum 28 day compressive strength determined by field-cured specimens as defined below. Do not remove forms until the approval has been obtained from the Engineer.

C. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of the concrete location of members, as specified in Section 03300 - CAST-IN-PLACE CONCRETE.

D. Form facing material may be removed not less than 4 days after placement, provided shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports and provided that concrete has achieved adequate compressive strength to safely support the load.

E. Removal of Forms:

1. Use necessary means and precautions to protect workmen, passer-by, the installed work and material of other trades and complete safety of structure.
2. Cut nails as well as form ties off flush leaving surfaces smooth and clean.
3. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surfaces and pointing up and rubbing the resulting pockets to match surrounding surfaces.
4. Flush holes resulting from spreader rods and sleeve nuts, using water, and solidly pack throughout the wall thickness with cement grout applied under pressure by means of grouting gun; grout shall be one part cement to 2-1/2 parts sand; apply grout immediately after removing forms.

3.7 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated or otherwise damage form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces.

END OF SECTION

SECTION
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Steel reinforcement for cast-in-place concrete as indicated on Drawings and as specified herein.

1.2 REFERENCES

A. ACI - American Concrete Institute

ACI 315 Details and Detailing of Concrete Reinforcement

ACI 318 Building Code Requirements for Reinforced Concrete

B. ASTM - American Society for Testing and Materials

ASTM A 82 Steel Wire, Plain, for Concrete Reinforcement

ASTM A 184 Fabricated Deformed Steel Bar Mats, for Concrete Reinforcement

ASTM A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

ASTM A 497 Welded Deformed Steel Wire Fabric, for Concrete Reinforcement

ASTM A 615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement

C. CRSI - Concrete Reinforcing Steel Institute

CRSI MSP-1 Manual of Standard Practice Placing Reinforcing Bars, Chapter 3

D. AWS - American Welding Society

AWS D12.1 Structural Welding Code

AWS D12.4 Structural Welding Code - Reinforcing Steel

1.3 SUBMITTALS

A. Mill Certificates: Submit steel producer's certificates of mill tests for reinforcing steel. Mill certificates will indicate chemical and physical properties of steel bars, including records of tensile and bend tests from Independent Testing Agency.

B. Shop Drawings: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures showing bars, arrangements and assemblies as required for fabrication and placement. Include special reinforcement required at openings through concrete structures.

1.4 TRANSPORTATION, HANDLING AND STORAGE

A. Deliver reinforcement to site bundled, tagged and marked. Use metal tags indicating bar sizes, lengths and other information corresponding to markings shown on placement diagrams.

B. Store concrete reinforcement materials at site off the ground and in covered storage sheds to prevent damage, rust and accumulation of dirt or deleterious materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Reinforcing bars shall be free of loose or flaky rust and mill scale or coating, including any other substance that would reduce or destroy bond with concrete.

B. Reinforcing Bars: Conform to SASO 2; or ASTM A 615 including supplementary requirement S1; or ASTM A 706. Use Grade 60 (fy = 415 MPa) deformed bars, unless otherwise indicated on Drawings.

C. Steel Tie Wire: Conform to ASTM A 82 plain cold-drawn steel, (fy = 465 MPa).

D. Welded Wire Fabric: Conform to SASO 224 or ASTM A 185, (fy = 500 MPa).

E. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.

1. Use wire bar type conforming to the recommendations of CRSI or precast concrete type supports, and as approved by the Engineer, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.

2. For exposed concrete surfaces, where legs of supports are in contact with forms, provide supports with plastic spacers.

2.2 FABRICATION

A. General:

1. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with ACI 315.

2. Reinforcement shall be bent cold unless otherwise permitted by the Engineer.

3. In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2. Bends or kinks not indicated on Drawings or final shop Drawings.

3. Bars with reduced cross-section due to excessive rusting or other cause.

4. Bars with surfaces having rust, rust scale or loose mill scale or contaminated with dirt, earth, paints, oils or other deleterious material.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrate as well as the conditions under which concrete reinforcement shall be installed and correct any unsatisfactory conditions. Proceed with the work after correcting unsatisfactory conditions in an acceptable manner to the Engineer.

3.2 INSTALLATION

A. Comply with the specified codes and standards, and **Concrete Reinforcing Institute** recommended practice for placing reinforcing bars, for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement to remove rust, rust scale and loose mill scale, dirt, earth, paints, oils or other deleterious material.

C. Position, support and secure reinforcement against displacement by formwork construction, or concrete placement operations. Locate and support reinforcing by chairs, runners, bolsters, spacers and hangers, as required.

D. Place reinforcement to obtain the minimum coverage for concrete protection. Arrange, space and securely tie bars and bar supports together with 1.6 mm annealed wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that ends are directed away from exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces as indicated but at least one full mesh and lace splices with 1.6 mm annealed wire. Offset end laps in adjacent widths to prevent continuous laps.

F. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 50 mm beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

G. Splices: Provide reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Comply with requirements on Drawings for location and lap of splices or, if no requirements are shown or indicated, with ACI 318 for minimum lap of spliced bars.

H. Protect reinforcement when not being worked and until placement of concrete by covering with polyethylene or similar impermeable sheeting.

I. No welding of reinforcement shall be permitted.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

1. PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Establishing general criteria for materials and mixes of cast-in-place concrete indicated on Drawings.

B. Cast-in-place concrete as indicated on Drawings and as specified herein.

C. Expansion and contraction joints, bearing pads and water stops for cast-in-place concrete works.

1.02 REFERENCES

A. ACI - American Concrete Institute

ACI 117	Standard Tolerances for Concrete Construction Material
ACI 211	Recommended Practice for Selecting Normal and Heavyweight Concrete
ACI 214	Recommended Practice for Evaluation of Compression Test Results of Field Concrete
ACI 301	Specification for Structural Concrete for Buildings
ACI 302	Recommended Practice for Concrete Floor and Slab Construction
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI 305	Recommended Practice for Hot Weather Concreting
ACI 308	Curing Concrete
ACI 309	Recommended Practice for Consolidation of Concrete
ACI 318	Building Code Requirements for Reinforced Concrete
ACI SP-66	ACI Detailing Manual

B. ASTM - American Society for Testing and Materials

ASTM C 31	Practice for Making and Curing Concrete Test Specimens in the field
ASTM C 33	Specification for Concrete Aggregates
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 88	Test Method for Soundness of Aggregates by Use of Sodium sulphate or Magnesium Sulphate
ASTM C 123	Test Method for Lightweight Pieces in Aggregates
ASTM C 138	Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete

ASTM C 142	Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C 143	Test Method for Slump of Portland Cement Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 156	Test Method for Water Retention by Concrete Curing Materials
ASTM C 171	Specification for Sheet Materials for Curing Concrete
ASTM C 173	Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 535	Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 618	Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM C 685	Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C 881	Specification for Epoxy-Resin-Base Bonding System for Concrete
ASTM D 75	Practice for Sampling Aggregates
ASTM D 1190	Specification for Concrete Joint Sealer, Hot-Poured Elastic Type
ASTM D 1191	Methods of Testing Concrete Joint Sealers
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM E 11	Specification for Wire Cloth Sieves for Testing Purposes
ASTM E 96	Test Methods for Water Vapor Transmission of Materials
ASTM E 154	Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

C. CRD - US Army Corps of Engineers

CRD-C 119	Flat and Elongated Particles in Coarse Aggregate
CRD-C 120	Flat and Elongated Particles in Fine Aggregate
CRD-C 400	Requirements for Water for Use in Mixing or Curing Concrete
CRD-C 513	Rubber Waterstops
CRD-C 572	Poly-Vinyl-Chloride Waterstops
CRD-C 589	Sampling and Testing Expansive Grouts

D. AASHTO - American Association of State Highway and Transportation Officials

AASHTO M 182	Burlap Cloth Made from Jute or Kenaf

1.03 SUBMITTALS

A. Detailed Drawings and Shop Drawings.

B. Design Analysis and Calculations: Where provision of design is specified in Contract Documents.

C. Product's Data: Submit manufacturer's specifications with application and installation instructions for proprietary materials and items including fusion bonded epoxy coated reinforcing bars, admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, coal tar epoxy paint, polyvinyl-chloride liner, polyethylene vapor barrier and dry shake finish materials.

D. Samples: Submit samples of materials as specified and as otherwise may be requested by Engineer, including names, sources and description as required.

E. Laboratory Test Reports: Submit copies of laboratory test reports for concrete materials and mix design tests or other certificates for concrete.

F. Material Certificates: Material certificates shall be signed by material manufacturer and the Contractor, certifying that each material item meets or exceeds the specified requirements.

G. Grout to be exposed to or in contact with soil and/or groundwater, substantiating suitability for specified environmental conditions.

H. Concrete mix design.

I. Placement Schedule: Prepare a placement schedule and submit to Engineer for review prior to start of concrete placement operations.

J. Methods of furnishing and delivering concrete in hot weather.

1.04 TRANSPORTATION, HANDLING, STORAGE, AND PROTECTION

A. Cement: Upon delivery at site of work, store cement separately in dry, weathertight, properly ventilated structures, with adequate provision for prevention of absorption of moisture.

B. Aggregates: Store aggregates in a manner to assure good drainage, to preclude inclusion of foreign matter, and to preserve the gradation. Protect fine aggregate from wind-caused

segregation.

C. Admixtures: Store admixtures at temperatures and under conditions recommended by the manufacturer. Protect each type of admixtures from contamination and intermingling with other materials as well as other admixtures.

D. Water: Store and transport in a manner to prevent heating of water.

E. Coal Tar Epoxy Paint: Packaging, labeling, delivering, and storing shall be in accordance with manufacturer's published instructions and recommendations.

F. Polyethylene Vapor Barrier: Protect vapor barrier from exposure to sunlight and according to the manufacturer's published instructions.

1.05 QUALITY ASSURANCE

A. Samples and Testing: Perform tests specified herein by an independent testing laboratory meeting the requirements of ASTM E 329 and approved by Engineer. Provide testing and laboratory services at no cost to the Owner.

B. Cement: Submit certified copies of laboratory test reports furnished by cement manufacturer for each lot of cement including test data, results and certification using sampling and testing procedures that are in conformance with the Contract Documents.

Sampled cement shall be tested as required by Engineer. No cement shall be used until test results are satisfactory. Cement that has been stored for more than four months after being tested shall be retested before use. Cement found unsatisfactory under test shall be immediately removed from site.

C. Aggregates: Conform to ASTM D 75. Use no aggregates until test results are approved by Engineer.

D. Water: Potable and in conformance with the requirements of the local authorities having jurisdiction.

E. Admixtures: Sampling and testing of admixtures used in concrete mix shall be in accordance with ASTM C 494. No admixture shall be used until test results are satisfactory.

F. Slump: Conform to ASTM C 143 and shall be performed in field under Engineer's supervision.

G. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to Engineer. Certificate of compliance must be signed by the material producer and the Contractor.

H. Workmanship:

1. Repair concrete work not conforming to the specified requirements, including strength, tolerances and finishes.

2. Correct deficient concrete as directed by Engineer at no cost to Owner.

When the results of strength tests of specimens shows failure to meet the specification requirements or where there is other evidence that quality of concrete is below requirements, core boring tests shall be made in conformance with ASTM C 42 and ACI 318.

If deficient, a structural analysis shall be made followed by a load test, where applicable

at no cost to Owner. Evaluation of results shall conform to ACI 318, Chapter 20.

2. PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Portland Cement: Types indicated herein shall comply with ASTM C 150 or SASO 143. Content of tricalcium aluminate (C_3A) shall not exceed 12% in Type I cement and 5 % in Type V cement.

1. For Concrete Work in Contact with Ground and below Ground Level: Provide concrete using Type I cement conforming to ASTM C150 modified with pozzolan or silica fume or microsilica or approved equal. Silica fume or microsilica, a pozzolanic material shall consist of more than 90% silicon dioxide with average particle size of approximately 0.15 micrometers. Silica fume or microsilica and shall be added to concrete mix at the rate of 8-10% weight of cement as per recommendations of Manufacturer and as approved by the Engineer.

2. For concrete work above ground floor level: Provide concrete using Type I cement.

3. Use only one brand of cement for each required type throughout the project, unless otherwise approved by Engineer.

4. Cement acceptance: Based on manufacturer's mill certificate certifying that furnished cement conforms to physical and chemical requirements of ASTM C 150. Engineer reserves the right, however, to sample and conduct such tests on cement as deemed necessary for compliance with Specification.

B. Water: Water for washing aggregate, mixing and curing concrete shall be free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances.

C. Aggregates: ASTM C 33 and as specified herein:

1. Supply aggregates from a source approved by Engineer and capable of supplying a sufficient quantity for the entire contract.

2. Maximum aggregate size:

a. For Suspended Slabs, Beams, Girders, Walls and Columns: 20 mm maximum.

b. For Footings, Thickened Slabs, and Slab on Grade: 40 mm maximum.

D. Fine Aggregates:

1. Fine aggregates: Natural sand or manufactured sand or a combination of the two with a composition of clean, hard, durable spherical or cubical particles

2. Limit the salt content of fine aggregate so as not to exceed limitations set out in Table 1 - TOTAL ALLOWABLE SALTS CONTENT.

TABLE 1 - TOTAL ALLOWABLE SALTS CONTENT

MAXIMUM ALLOWABLE PERCENTAGE BY MASS

	IN FINE AGGREGATE BY WEIGHT OF FINE AGGREGATE	IN COARSE AGGREGATE BY WEIGHT OF COARSE AGGREGATE	TOTAL BY WEIGHT OF CEMENT
Chlorides (NaCl)	0.06	0.05	0.13
Sulphates (SO_3)	0.04	0.50	4.00

Shaded areas includes maximum percentage of salts in cement, water, and in other mix constituents of concrete.

3. Limit deleterious substances in fine aggregate to the amounts shown in Table 2 - ALLOWABLE DELETERIOUS SUBSTANCES IN FINE AGGREGATE.

TABLE 2 - ALLOWABLE DELETERIOUS SUBSTANCES IN FINE AGGREGATE

ITEM	MAXIMUM ALLOWABLE PERCENTAGE BY MASS
Clay Lumps and Friable Particles	3
Material Fiber less than 75 micron, No. 200 sieve	3
Lightweight Particles (determined in accordance with ASTM C 123)	0.50

Total of deleterious materials shall not exceed 3 percent of the weight of aggregate.

4. Grading of fine aggregate shall be within the limits shown in Table 4 - GRADING LIMITS OF COMBINED FINE AGGREGATE MIX FOR CONCRETE.

E. Coarse Aggregates:

1. Coarse aggregate shall consist of crushed or uncrushed gravel, crushed stone or a combination of the two, and shall be composed of clean, hard, uncoated particles.

2. Salt content of coarse aggregate shall not exceed the limitations as set out above in Table 1 - TOTAL ALLOWABLE SALTS CONTENT.

3. Deleterious substances shall be limited in the coarse aggregate to the amounts shown below in Table 3 - ALLOWABLE DELETERIOUS SUBSTANCES IN COARSE AGGREGATE.

TABLE 3 - ALLOWABLE DELETERIOUS SUBSTANCES IN COARSE AGGREGATE

TYPE OR LOCATION OF CONCRETE	MAXIMUM ALLOWABLE PERCENT BY MASS			
	CLAY LUMPS & FRIABLE PARTICLES (%)	MATERIAL FINER THAN 75 MICRON** (%)	ABRASION LOSS	
			500 REVS.	100/500 REVS.
Slab subject to traffic abrasion, floors, sidewalks & pavements	1.00	1.00	35	0.25
Other classes of concrete	3.00	2.00	40	0.28

** ASTM Sieve No. 200

4. Coarse aggregate grading shall be set within the limits shown in Table 4 - GRADING LIMITS OF COMBINED FINE AND COARSE AGGREGATE MIX FOR CONCRETE.

TABLE 4 - GRADING LIMITS OF COMBINED FINE AND COARSE AGGREGATE MIX FOR CONCRETE

ASTM SIEVE (mm)	Percentage Passing (by Mass)	
	Grading A	Grading B
50	100	-
38.1	90 - 100	100
19	65 - 85	90 - 100
9.5	35 - 60	55 - 70
4.75	25 - 45	35 - 55
2.36	22 - 40	30 - 45
1.18	18 - 38	25 - 42
0.16	15 - 33	22 - 38
0.30	6 - 17	10 - 20
0.15	0 - 6	0 - 8
75 micron	0 - 2	0 - 2

2.02 MISCELLANEOUS MATERIALS

A. Concrete Admixtures:

1. Use admixtures complying with ASTM C 494 Types A, B, D, F or G provided that they are included in mix design and subject to Engineer's approval. Admixtures containing calcium chloride ions or other ions producing deleterious effect shall not be permitted.

2. Compatibility of admixtures with the brand of cement being used shall be determined by testing samples at temperatures at which materials will be used and over a period of time representative of the proposed mixing and delivery period. Test shall demonstrate that the admixture used shall not cause either short or long term deficiencies in the quality and durability of the concrete.

B. Joint Materials and Bearing Pads:

1. Joint Filler: Provide bituminous fiber joint filler conforming to ASTM D 1751 of thickness and widths as shown on Drawings. Joint filler shall be preformed expansion joint filler board recommended for joints in concrete slabs on grade and pavings manufactured from high grade fibers which are bitumen impregnated and compounded into compressible non-extruding board.

2. Joint Sealing Compound: Two-component polyurethane elastomeric compound complying with the requirements of Section 07900 - SEALANTS unless indicated otherwise.

3. Where required, provide Neoprene bearing pads of durometer hardness: Grade 60.

C. Waterstops:

1. Flat, dumbbell or center bulb type waterstops shall be of high quality poly-vinyl-chloride granules. PVC waterstops size shall be as recommended by manufacturer for the intended application, unless otherwise shown on Drawings, with minimum 10 mm thickness and not less than 150 mm width. Only butt joints may be made on site using manufacturer's equipment and in accordance with the manufacturer's instructions. Junction pieces must be factory made by manufacturer. PVC waterstops shall have a 100 percent solids content, 13.7 MN/m tensile strength and 285 percent elongation at break with a minimum tear resistance 75 kN/m. Waterstops shall have excellent resistance to sewage, dilute acids and alkalis. Materials shall comply with the requirements of CRD-C 572 or equivalent.

D. Vapor Barrier:

1. Polyethylene sheeting conforming to ASTM D 4397, minimum 200 microns thick having a vapor permeance rating not exceeding 0.063 perms, and shall be laid with 300 mm overlapping.

E. Bonding Agents:

1. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application.

2. Epoxy-Resin Bonding Agent: A two-component, mineral filled, epoxy-polysulphide polymer.

F. Concrete Curing Materials:

1. Absorptive Cover: Conform to AASHTO M 182, Class 3; burlap cloth made from jute or kenaf and with a minimum density of 290 gm/m².

2. Moisture-Retaining Cover: Provide one of the following in compliance with ASTM C 171:

a. Waterproof paper.

b. Polyethylene film.

c. White burlap-polyethylene sheet.

3. Liquid Curing Compound: Conform to ASTM C 309, Type 1. Material for use on slabs to which topping is to be bonded shall be a degrading type which shall not inhibit the bond between topping and slab. When non-pigmented compound is used, it shall

contain a fugitive dye. Aqueous solution of sodium silicate with non-

acid penetrating agent, reacting chemically with free lime in concrete to form a hard, non-dusting surface.

G. Floor Finish Material:

1. Chemical Floor Hardener: Colorless aqueous solution containing a blend of magnesium flourosilicate and zinc flourosilicate combined with a wetting agent, containing not less than 240 g of flourosilicate per liter. Apply to exposed concrete slabs not indicated or scheduled to receive subsequent finishes.

2.03 CLASSES OF CONCRETE

A. Water-cement ratios listed in the following table are maximums, cement contents and compressive strengths are minimums. There shall be no increase in water-cement ratio or reduction in cement content based upon attainment of compressive strengths higher than those specified.

CLASSES OF CONCRETE	20	30	35
28-DAYS COMPRESSIVE STRENGTH TEST CYLINDER (N/mm^2)	20	30	35
MINIMUM CEMENT CONTENT - 100 mm SLUMP (Kg/m^3)	250	360	400
MAXIMUM FREE WATER CEMENT RATIO (BY WEIGHT)	0.55	0.43	0.43

2.04 MIX DESIGN

A. If the fine aggregate conforms to ASTM C 33, the mix design shall be in accordance with ACI 301. If the fine aggregate does not conform with ASTM C 33, the mix design shall be based upon trial mixes. Trial mixes shall be proportioned under the supervision of Engineer. Mix design shall be initiated within two months after award of Contract and shall include at least the following:

1. For each specified cement content and the maximum water-cement ratio, develop curves comparing slump to percentage of fine aggregate ratios. Select fine to coarse aggregate ratios to produce mixtures ranging from excess fine aggregate to excess coarse aggregate with insufficient mortar to fill the voids. Optimum fine to coarse aggregate ratio shall be the one at which the higher slumps are produced for the specified water-cement ratio. Record and plot the combined aggregate gradations to reflect limits of acceptable and unacceptable combinations of ingredients. Further testing shall be done at fine to coarse aggregate ratios which will produce adequate workability for the construction for which the mixture is being used while maintaining the lowest possible water-cement ratio.

2. Develop curves of water-cement ratio versus compressive strength for at least five water-cement ratios.

3. Develop curves comparing compressive strength data from at least five different cement contents ranging from 20 MPa to 30 Mpa 28-days cylinder strength for each optimum aggregate ratio and the aggregate ratio judged most workable for general casting.

4. For the mixes judged appropriate for construction, prepare strength gain curves for 3, 5, 7, 14, 28, and 56-day strengths.

5. Provide cement chemical and physical test results for different types of cement used.

6. For each trial batch, record the following:

    a. Weight and absolute volumes of proposed mixtures. Express aggregate weights in saturated-surface-dry condition.

    b. Slump.

    c. Individual aggregate gradations and calculated mixture combined aggregate grading.

    d. Temperatures.

    e. Wet and dry densities.

    f. Aggregate moisture contents.

    g. Water-cement ratio corrected for aggregate absorption.

    h. Test specimen curing procedures.

    i. Compressive strength at each age.

7. Slump Limits:

    a. Proportion and design mixes to result in concrete slump at the point of placement as follows:

        (1) Sloping Surfaces: 75 mm maximum slump.

        (2) Reinforced Foundation Systems: 50 mm minimum, and 75 mm maximum slump.

        (3) Other Concrete: 100 mm maximum slump.

    b. Slump of concrete with super-plasticizer shall not exceed 250 mm.

3. PART 3 - EXECUTION

3.01 BATCHING AND MIXING CONCRETE

A. Concrete may be mixed at batch plants or it may be transit mixed as specified herein. Batch plants must comply with the requirement of ACI 304, with sufficient capacity to produce concrete of the qualities specified in quantities required to meet construction schedules. Plant facilities are subject to testing, laboratory inspection as well as approval by Engineer. Quantities by weight of concrete ingredients, measured separately for each batch with date,

time, and mix number shall be recorded.

B. Truck Mixers: When a truck mixer is used to complete mixing of central plant batched materials, water shall be added at mixing speed before completion of mixing. Retempering of concrete will not be permitted. Each truck shall carry a ticket stamped by time clock to show date and time the loading of each truck was completed. Trucks shall meet the requirements specified in ACI 304.

C. Job site mixing will not be permitted.

D. Ready-Mix Concrete:

1. Comply with the requirements of ASTM C 94, as specified herein, provided the quantity, rate of delivery and unrestricted progress of work permitted, in accordance with placement schedule. During hot weather, and/or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required, as specified below. Proposed changes in mixing procedures other than herein specified, must be accepted by Engineer before implementation.

3.02 FIELD QUALITY CONTROL

A. Employ an approved separate testing laboratory to perform field quality control testing.

B. Quality Control Testing During Construction:

1. Sampling Fresh Concrete: Conform to ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: Conform to ASTM C 143; one test for each concrete load at point of placement and one for each set of compressive strength test specimens.

3. Concrete Temperature: Test daily when air temperature is 26^{o}C. and above, and each time a set of compression test specimens made. Test concrete temperature throughout the pour when the ambient temperature exceeds 30^{o}C.

4. Compressive Strength Tests: Provide one set of 6 standard cylinders for each 20 m^3 or fraction thereof, of each mix design placed in any one day or for each 100 m^2 of surface area placed; 2 specimens tested after 7 days, 3 specimens tested after 28 days, and one specimen retained in reserve for later testing if required. Additional test specimens may be cast for construction progress control and form stripping.

a. When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

b. When the strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

5. Testing laboratory shall report test results in writing to Engineer, and Ready-Mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain Project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength and type of break for both 7-day tests and 28-day tests.

C. Additional Tests:

1. The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and characteristics +have not been attained in the structure, as directed by Engineer. The testing service shall conduct tests to determine the strength and characteristics of the in-place concrete by compression tests on cured cylinders complying with ASTM C 42, or by load testing specified in ACI 318, or other acceptable non-destructive testing methods, as directed.

D. Evaluation of Quality Control Tests:

1. Do not use concrete delivered to the final point of placement which has slump outside the specified values.

2. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of a set of three consecutive compressive strength tests results equal or exceed the 28-day design compressive strength of the type or class of concrete.

   No individual strength test shall fall below the required compressive strength by more than the value of 2.75 N/mm².

   a. Strength tests of specimen cured under field conditions may be required by Engineer to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by field quality control laboratory at the same time and from the same samples as the laboratory-cured specimens.

   b. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field-cured cylinders is less than 5% of companion laboratory-cured cylinders.

   c. When laboratory-cured cylinder strengths are higher than the minimum required compressive strength, field-cured cylinder strengths need not exceed the minimum required compressive strength by more than 2.75 N/mm² even though criterion is not met.

   d. If individual test of laboratory-cured specimens produce strengths more than 2.75 N/mm² below the required minimum compressive strength, or if tests of field-cured cylinders indicate the deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.

   e. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to correction at no extra cost to the Owner.

3.03 CONCRETE PRE-PLACEMENT INSPECTION

A. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and securely install all required inserts, anchors, sleeves, conduits and other items specified under other sections to be embedded or cast-in.

B. Where concrete is placed on ground or sub-course, the foundation upon which concrete is placed shall be clean, damp, and free from standing or running water. Prior to placing concrete, the earth foundation shall have been satisfactorily compacted and all subgrades approved by Engineer prior to placing concrete.

C. Soil at bottom of foundation systems are subject to testing for soil bearing value by the testing laboratory, as directed by Engineer. Place concrete immediately after approval of foundation excavations.

D. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

E. Polyethylene vapor barrier shall be placed between concrete blinding and concrete footing leaving extra width on both sides which shall then be tucked up to wrap the concrete footing after the form removal.

3.04 CONCRETE PLACEMENT

A. General: Place concrete in compliance with the practices and recommendations of ACI 301 and ACI 304 and as specified herein:

1. Deliver concrete from central plant to the place of final deposit in a continuous manner and without segregation or loss of ingredients. Suspend placing when the sun, heat, wind, or limitation of facilities prevent proper finishing and curing of the concrete. Place concrete in the forms or excavation as close as possible in final position, in uniform, approximately horizontal layers, not over 600 mm deep unless otherwise directed.

   Do not drop concrete freely for more than 1.5 m, nor allow it to drop freely through congested rebarring areas which could cause segregation. This drop distance may be increased by Engineer at his discretion where it can be shown by Contractor that a greater drop will not result in segregation. Tremies or other approved means shall be employed to eliminate segregation. Conduits and pipes shall not be embedded in concrete unless specifically indicated or specified. Do not place concrete in any form until forms have been inspected by Engineer and permission has been given to proceed.

2. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the project site and dispose of it off site at no extra cost to Owner.

B. Transportation Time Internal:

1. Concrete mixed in central plant and transported by non-agitating equipment shall be placed in the forms within 30 minutes. Concrete transported in truck mixers or truck agitators shall be delivered to the site and placed in the forms within 60 minutes. This time limitation may be increased by Engineer at his discretion when additional super-plasticizer is added to the concrete mix so as to retard the initial set for greater periods. In no case will additional water be added to the mix (tempering) after the concrete leaves the batching plant.

C. Conveying Concrete:

1. Concrete may be conveyed by chute, conveyor, or pump if so approved by Engineer. Aluminum chutes or pipelines shall not be used for conveying concrete. Approvals will not be given for chutes or conveyors requiring changes in the concrete design

mix for desired operation. Conveying equipment shall be cleaned when not in use.

2. Chutes and Conveyors: Chutes shall be rounded in cross section, rigid in construction, protected from overflow and slopes not exceeding one vertical to three horizontal. Conveyors shall be designed to operate assuring uniform flow of concrete without segregation of ingredients, loss of mortar, or change in slump.

3. Pumps: Placing concrete by pumping methods shall conform with ACI 301 Chapter 8. Operate and maintain pumps so that a continuous stream of concrete is delivered into the forms without air pockets, segregation, or change in slump exceeding 5 cm. Use pumps which can pump mixes as designed. Mixes shall not be adjusted to accommodate smaller pumps.

D. Placing Concrete into Forms:

1. Deposit concrete in the forms for horizontal slabs in horizontal layers not deeper than 60 mm unless additional thickness is permitted by Engineer, and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

2. Consolidate concrete placed in forms with mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions. Vibration of forms and reinforcements will not be permitted.

3. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete and at least 150 mm into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.

4. In order to allow for shrinkage or settlement, at least 2 hours shall elapse after placing concrete in walls, columns or stems of deep T-beams before depositing concrete in girders, beams and slabs supported thereof, unless otherwise specified or shown on the plans.

5. Place concrete in girders, slabs and shallow T-beam construction in one continuous operation for each span, unless otherwise detailed. Deposit concrete uniformly for the full length of the span then bring up evenly in horizontal layers.

6. Place concrete in columns in one continuous operation to the bottom of the deepest super structure member framed over the column.

7. No concrete shall be placed in the super-structure until the column forms have been stripped sufficiently to determine the character of the concrete in the columns. Loads of superstructure shall not be allowed to come upon abutments, piers brackets and column bents until they have been in place at least 7 days, unless otherwise permitted by Engineer.

8. Maximum vertical drop in placing concrete shall not exceed 1.5 m.

E. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.

2. Maintain reinforcing steel in the proper position continuously during concrete placement operations.

3. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

4. Consolidate concrete placed in beams and girders of supported slabs, and against bulkheads of slabs on ground, as specified for formed concrete structures. Consolidate concrete in the remainder of slabs by vibrating bridge screed, roller pipe screed, or other acceptable methods. Limit the time of vibrating consolidation to prevent bringing an excess of fine aggregate to the surface.

5. Bring slab surfaces to the correct level with a straightedge and strike off. Use bull floats to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on plastic surfaces. Do not disturb slab surfaces prior to finishing operations.

F. Bonding:

1. Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent, and clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly and do not leave laitance, loose particles of aggregate, or damaged concrete at the surface.

2. Prepare for bonding of fresh concrete to new concrete that has set but is not fully cured, as follows:

   a. At joints between footings and walls or columns, and between walls or columns and beams or slabs they support, and elsewhere unless otherwise specified herein, dampen, but do not saturate, the roughened and cleaned surface of set concrete immediately before placing fresh concrete.

   b. At joints in exposed work: At vertical joints in walls; at joints in girders, beams, supported slabs and other structural members; and at joints designed to contain liquids, dampen, but do not saturate, the roughened and cleaned surface of set concrete and apply a liberal coating of neat cement grout.

   c. Use cement grout consisting of equal parts Portland cement and fine aggregate by weight and not more than 24 liters of water per sack of cement. Apply with a stiff broom or brush to a minimum thickness of 2 mm. Deposit fresh concrete before cement grout has attained its initial set.

   d. In lieu of neat cement grout, bonding may be a commercial bonding agent. Apply to cleaned concrete surfaces in accordance with the printed instruction of the bonding material manufacturer.

   e. Prepare for bonding of fresh concrete to fully-cured hardened concrete by using an epoxy-resin bonding agent as follows:

      (1) Handle and store epoxy-resin adhesive binder in compliance with the manufacturer's printed instructions, including safety precautions.

      (2) Mix the epoxy-resin adhesive binder in the proportions

recommended by the manufacturer, carefully following directions for safety of personnel.

(3) Before depositing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with epoxy-resin grout not less than 2 mm thick. Place fresh concrete while the epoxy-resin material is still tacky, without removing the in-place grout coat, and as directed by the epoxy-resin manufacturer.

G. Hot Weather Placing:

1. Unless otherwise approved, concreting shall be considered Hot Weather Concreting, as defined by ACI 305, and shall be in accordance with the recommended practice of ACI 305. Ample water supply, hoses, and foggers shall be available at all concrete placements.

2. At the time of placement, the temperature of the concrete shall not exceed 32°C. Concrete exceeding the specified temperature shall be rejected and dumped at a designated disposal area.

3. Cool ingredients before mixing to maintain concrete temperature at time of placement below 32°C. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water. Ice shall be completely melted prior to completion of mixing of concrete.

4. Reinforcing steel and forms shall be protected from direct sun rays and shall be cooled with water immediately before concrete placing so that the concrete temperature specified can be maintained.

5. The temperature of the concrete shall be determined immediately before placement.

6. Provide means to limit the temperature rise of mass concrete to reduce undesirable thermal stresses and cracking. Such means shall include limitation of rate of placement, placement of concrete during cool weather, precooling concrete ingredients, artificial cooling, or other approved methods.

3.05 JOINTS

A. Construction Joints:

1. Clean surface of concrete construction joints and remove laitance.

2. Immediately before new concrete is placed, wet construction joints and remove standing water.

3. Locate construction joints in floors within the middle third of spans of slabs, beams and girders. Joints in girders shall be offset a minimum distance of two times the width of intersecting beams.

4. Place beams, girders and haunches monolithically as a part of a slab system, unless otherwise required.

5. Beams, girders or slabs supported by columns or walls shall not be cast or erected until concrete in the vertical support members is no longer plastic.

6. Locate and install construction joints so as not to impair strength and appearance of

the structure, as acceptable to Engineer. Locate construction joints, if required, as follows:

a. In walls, at top of footings; at top of slabs on ground, at top and bottom of door and window openings or as required to conform to the architectural details and as directed by Engineer; and at the underside of the deepest beam or girder framing into wall.

b. In columns, at the top of footing and at the underside of the deepest beam or girder framing into the column.

c. Place wall construction joints at 18 m maximum, and wall control joints at 6 m maximum.

B. Expansion Joints:

1. Provide expansion joints to permit both horizontal and vertical differential movements. Place expansion joints at locations shown on the Drawings.

2. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors bonded only on one side of joints) shall not be permitted.

3. Place premoulded joint filler at locations shown on Drawings, follow manufacturer installation details.

C. Waterstops:

1. Provide waterstops in joints where shown on drawings. Install waterstops to form a continuous diaphragm in joint. Make provisions to support and protect waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions. Protect waterstop material from damage where it protrudes from any joints.

D. Isolation Joint in Slab-on-Grade:

1. Provide isolation joints in slab-on-grade at points of contact between slabs and vertical surfaces and elsewhere as indicated.

E. Control Joints in Slab-on-Grade:

1. Provide control joints in slab-on-grade to form panels or pattern. Use inserts, 6 mm wide by 1/5 to 1/4 of slab depth or 1/10 to 1/8 of slab depth with bottom crack inducer. Joints may be saw cut or crack inducers may be used in conjunction with sawing.

2. Form control joints by inserting a premolded hardboard or fiberboard strip into the fresh concrete until the top surface of the strip is flush with slab surface. After concrete curing for at least 7 days, remove inserts and clean groove of loose debris. Apply joint sealant material in the manner recommended by the manufacturer.

3.06 FINISH OF FORMED SURFACES

A. Rough Form Finish:

1. As-cast rough form finish is permitted for formed concrete surfaces that are to be concealed in the finish work or by other construction, unless otherwise indicated.

B. Smooth Form Finish:

1. Provide as-cast smooth form finish for formed concrete surfaces that are to be exposed to view, or that are to be covered with a coating material applied directly to the concrete, or a covering material bonded to the concrete such as waterproofing, dampproofing, painting, or other similar system.

2. Produce smooth form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrical with a minimum of seams. Repair and patch defective areas with all fins or other projections completely removed and smoothed.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise indicated.

3.07 MONOLITHIC SLAB FINISHES

A. Finished floor and roof slab surfaces shall be true plane surfaces with no deviation in excess of 3 mm when tested with a 3 m straightedge. Surfaces shall be pitched to drain.

1. Steel Trowelled (Hand) Finish: Slabs shall be screeded and floated with straightedges to bring the surface to the required finish level with no coarse aggregate visible. Concrete while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be wood floated to a true, even plane. Floor surfaces, after the surface moisture has disappeared, shall be steel trawled to a smooth, even, dense finish free from blemishes including trowel marks. Steel trowelled finish shall be provided for resilient flooring, thin-set ceramic tile, carpeting, where liquid waterproofing is to be applied, and where no other finish is specified.

2. Power Machine Finish: In lieu of hand finishing, an approved power finishing machine may be used. The preparation of surfaces for finishing by machine shall be in general as herein before specified for hand finishing. Finished surfaces shall be free of machine marks, ridges, or other blemishes.

3. Rough Slab Finish: Tamp concrete to force aggregates away from surface, then screed with a straightedge to produce a uniform surface. Rough slab finish surfaces shall be provided for ceramic tile except thin-set installation, quarry tile, floor toppings, insulation, built-up roofing, travertine, precast pavers with waterproof membrane, or terrazzo.

4. Broom Finish: Concrete shall be screeded and floated to the required finish level with no coarse aggregate visible. While concrete is still green, steel or wood trowel to an even, smooth finish and then broom with a fiber bristle brush in a direction transverse to that of the main traffic. Broom finish surfaces shall be provided for driveways and ramps and all exterior slabs, and walks not otherwise shown or specified. Finishing shall comply with the requirements of ACI 345, Chapter 10.

3.08 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and excessive hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.

2. Start curing procedures as soon as free moisture has disappeared from concrete surface. Continue curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at the end of final curing period.

B. Curing Methods:

1. Perform curing of concrete by moist curing, or by moisture-retaining cover curing, by membrane curing, or by combination thereof, as specified below:

a. For curing, use only water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.

b. Provide moisture curing by any of the following:

(1) Keeping the surface of the concrete continuously wet by covering it with water.

(2) Continuous water-fog spray.

(3) Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive cover continuously wet. Place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a 100 mm lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:

a. Cover the concrete surfaces with the specified moisture-retaining cover for curing concrete, placed in the widest practicable width with sides and ends lapped at least 76 mm and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during the curing period using cover material and waterproof tape.

3. Provide liquid curing-hardening compound as follows:

a. Apply to horizontal surfaces when concrete is dry to touch by means of power spray, or hair broom in accordance with manufacturer's directions.

b. Apply to vertical surfaces immediately after forms are stripped and where form coating other than oils have been used, in accordance with manufacturer's directions.

C. Curing Formed Surfaces:

1. Cure formed concrete surfaces, including the undersides of girders, beams, supported slabs and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces:

1. Initially cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by moist curing, whenever possible.

2. Final cure unformed surfaces, unless otherwise specified by any of the methods specified above, as applicable.

3. Final cure concrete surfaces to receive finish flooring by use of moisture-retaining cover, unless otherwise acceptable to Engineer.

E. Temperature of Concrete During Curing:

1. When the atmospheric temperature is 26 degrees C. and above or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or moisture-retaining covering. Protect the concrete continuously for the concrete curing method. Provide hot weather protection complying with the requirements of ACI 305.

2. Maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceed 2 degrees C in any one hour and 10 degrees C in any 24-hour period.

F. Protection for Mechanical Injury:

1. During the curing period, protect concrete from damaging mechanical disturbances, including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations.

3.09 SETTING OF MISCELLANEOUS ITEMS

A. Miscellaneous materials in connection with concrete construction shall, where practicable, be placed and secured in position when the concrete is placed. These materials include but are not limited to:

1. Anchors and anchor bolts.

2. Frames or edging.

3. Hanger, inserts and metal ties.

4. Door bucks.
5. Pipe supports and pipes passing through walls.

6. Pipe sleeves, conduits and drains.

7. Flashing reglets.

8. Masonry dovetail anchor slots.

B. Anchor bolts for machines shall be set to templates.

1. Bolts shall be plumbed carefully.

2. Location and elevation checked with instrument.

3. Held in position rigidly to prevent displacement while concrete is being placed.

C. Place embedded items prior to concreting.

D. Position embedded items accurately and provide supports against displacement.

E. Aluminum shall not be embedded in concrete except where aluminum is protected from direct contact with the concrete.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams. Maintain the accurate location of reinforcing steel during concrete placement.

B. Filling-In: Fill-in holes and openings left in concrete structures for the passage of work by other trades, unless otherwise shown or directed, after the work of other trades is in place. Mix place and cure concrete as herein specified, to blend with in-place construction. Provide all other miscellaneous concrete filling shown or required to complete the work.

C. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-trowelling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

D. Equipment Bases and Foundations: Provide machine and equipment bases and foundations. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of the manufacturer furnishing the machines and equipment.

3.11 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas:

1. Repair and patch defective areas with cement mortar immediately after removal of forms, but only when directed by Engineer.

2. Cut out honeycomb, rock pockets, voids over 12 mm diameter, and holes left by tie rods and bolts, down to solid concrete but in no case, to a depth of less than 25 mm. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean, dampen with water, and brush-coat area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to Engineer.

3. For exposed to public view surfaces, blend white Portland cement and standard Portland cement so that when dry, the patching mortar will match the color of the surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.

4. Fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure complete filling.

B. Repair of Formed Surfaces:

1. Repair exposed-to-view formed concrete surfaces, where possible, that contain defects which adversely affect the appearance of the finish. Remove and replace the

concrete having defective surfaces if the defects cannot be repaired to the satisfaction of Engineer.

Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by the rods and bolts; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.

2. Repair concealed formed concrete surfaces, when possible, that contain defects that adversely affect the durability of the concrete. If defects cannot be repaired, remove and replace the concrete having defective surfaces.

   At watertight structures, cracks shall be repaired using flexible grout injection (polyurethane or approved equal).

   Surface defects include cracks and surface deficiencies which penetrate to reinforcement or completely through non-reinforced sections, honeycomb, rock pockets, holes left by tie rods and bolts and spalls.

C. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as specified herein.

3. Repair finish unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, including crazing, cracks which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

4. Correct high areas in unformed surfaces by grinding after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

5. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Proprietary patching compounds may be used when acceptable to Engineer.

6. Repair defective areas, except random cracks and single holes not exceeding 25 mm diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 19 mm clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with a neat cement grout coating, or use concrete bonding agent.

   Place patching concrete before grout takes its initial set. Mix patching concrete of the same materials to provide concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

7. Repair isolated random cracks and single holes not over 25 mm in diameter by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and

clean of dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with a neat grout coating. Place dry pack before the cement grout takes its initial set. Mix dry pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

8. Repair methods not specified above may be used, subject to the acceptance of Engineer.

END OF SECTION

SECTION
BRICK MASONRY

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Brick masonry and related accessories for walls and partitions as indicated on Drawings.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials:

ASTM A 82 Specification for Cold-Drawn Steel Wire for Concrete Reinforcement

ASTM A 153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM C Specification for BrickMasonry Units

ASTM C 144 Specification for Aggregate for Masonry Mortar

ASTM C 150 Specification for Portland Cement

ASTM C 207 Specification for Hydrated Lime for Masonry Purposes

ASTM C 270 Specification for Mortar for Unit Masonry

ASTM C 426 Drying Shrinkage of Concrete Block

ASTM E 149 Bond Strength of Mortar to Masonry Units

B. ICBO - International Conference of Building Officials:

UBC Uniform Building Code

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including laboratory test reports for each type of concrete masonry unit, accessories and other manufactured products, as well as certifications of compliance with the specified requirements for each type.

B. Shop Drawings: Submit cutting and setting drawings for trim units showing sizes, profiles and locations of each unit required.

C. Samples: Submit concrete unit masonry samples showing color and texture as well as ties and anchors for the Engineer selection and approval.

1.4 TRANSPORTATION, HANDLING AND STORAGE

A. Deliver masonry materials to site in an undamaged condition marked with name of manufacturer and identification of contents. Store masonry materials under waterproof covers on planking clear of ground and protected from damage, dirt, stain, water and wind.

1.5 QUALITY ASSURANCE

A. Engage a commercial testing laboratory approved by the Engineer to perform tests as specified below at no extra cost to Owner. Submit information regarding testing laboratory and qualifications of technical personnel to the Engineer for approval.

B. Tests: Testing laboratory shall test mortar materials, mortar and masonry panels as specified. Certified test reports shall identify materials by type, brand name and manufacturer and/or by origin. Use no mortar materials until laboratory test reports are approved by the Engineer. After tests have been made and materials approved, no changes shall be made without additional test and approval of the Engineer.

C. Testing: Materials proposed for use shall be tested for compliance with specifications in accordance with test methods contained in the referenced specifications and as follows:

1. Mortar Type N: Test for compressive strength and water retention. Mortar Type N shall have a compressive strengths at 7 days and 28 days as follows:

- 3.10 MPa at 7 days
- 5.17 MPa at 28 days

2. Brick Masonry: Test for compressive strength, weight and water absorption.

D. Mock-Up: Before starting masonry work, construct sample panel 3 m long by 2 m high for the Engineer's approval.

1.6 JOB CONDITIONS

A. Protect partially completed masonry against weather, when work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane at least 600 mm down both sides of walls and anchor securely in place.

2. PART 2 - PRODUCTS

2.1. MATERIALS

A. Brick Masonry:

1. Manufacturer: Obtain brick masonry from one manufacturer, of uniform texture and color for each kind required for each continuous area and visually related areas.

2. Sizes: Manufacturer's standard sizes with thickness as indicated on drawings.

B. Mortar and Grout Materials:

1. Portland Cement: ASTM C 150, Type I. Provide natural color cement as required to produce the required mortar color.

2. Hydrated Lime: ASTM C 207, Type S.

3. Sand (for Mortar): ASTM C 144, except for joints less than 6 mm use aggregate graded with 100 percent passing the No. 16 sieve.

4. Fine Grout: Consist of fine aggregate conforming to ASTM C 404, size No. 1. Use fine grout in cells containing pipes and conduits.

5. Coarse Grout: Consist of fine and coarse aggregates conforming to ASTM C 404, size No. 89.

6. Water: Clean, potable and free of deleterious materials.

C. Mortar and Grout Mixes:

1. Measurement: Use methods which will ensure that required proportions are controlled and accurately maintained. Measure aggregate materials in a damp, loose condition.

2. Mortar: Comply with ASTM C 270, Type N for interior and Type S for exterior.

3. Grout: Comply with ASTM C 476; grout to be used in cores where reinforcements are placed.

4. Mixing: Combine and mix cement, lime, water, and aggregates for a minimum of 5 minutes in a mechanical batch mixer.

5. Do not add air-entraining agents or other admixtures to mortar or grout materials unless otherwise indicated on Drawings or instructed by the Engineer.

6. Do not use calcium chloride in mortar or grout.

D. Reinforcing Bars:

1. Reinforcing bars shall conform to ASTM A 615, Grade 60, deformed; sizes as indicated on Drawings.

E. Masonry Accessories:

1. Joint Reinforcement and Ties for Masonry:

a Provide welded wire units from cold-drawn steel wire complying with ASTM A 82, with deformed continuous side rods and plain cross-rods, and a unit width

of 38 mm to 50 mm less than thickness of wall or portion. Reinforcement shall be hot-dip galvanized after fabrication with 22 grams zinc-coating conforming to ASTM A 116, Class 3. Provide type of reinforcement as follows with 3.76 mm single pair of side rods:

1) Ladder design with perpendicular 3.76 mm cross rods spaced not more than 400 mm on center.

2) Truss design with 3.76 mm continuous diagonal cross rods spaced not more than 400 mm on center.

2. Anchoring Devices for Masonry: Provide straps, bars, bolts and rods fabricated from not less than 3.76 mm sheet metal or 10 mm diameter rod stock, unless otherwise indicated.

3. Inserts for Masonry:

1) Unit Type: Furnish cast iron or malleable iron inserts of the type and size shown, hot-dip galvanized after fabrication with 44 grams zinc coating, ASTM A 153, Class B 2.

2) Dovetail Slots: Where shown, furnish dovetail slots with filler strips, hot-dip galvanized as above.

3) For installation of concrete inserts refer to the concrete Sections of these Specifications as well as the specific requirements of the concrete installer regarding placement of inserts which are to be used by the masonry installer for anchoring of masonry work.

4. Pre-molded Control Joint Strips: Solid rubber strips with a durometer hardness of 60 to 80 as determined by ASTM D 2240, designed to fit standard sash block and maintain lateral stability in masonry wall, size and configuration as indicated.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation: Conform to the requirements of UBC 85 or ACI 531-83.

B. Thickness: Build masonry construction to full thickness shown on Drawings. Build single-width walls to the actual thickness of the masonry units, using units of nominal thickness indicated.

C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 200 mm of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

D. Cut masonry units with motor-driven saws to provide clean, sharp, un-chipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

E. Units erected when the ambient air has a temperature of more than 42^{o}C in the shade and a relative humidity of less than 5% shall be protected from direct exposure to wind or sun for 48 hours after construction. Absorption rates of masonry units shall be adjusted by previously wetting to ensure a good solid bond with the mortar.

F. Bond Pattern for Exposed Masonry: Lay exposed masonry in the bond pattern shown, or if not shown, lay in running bond with vertical joint in each course centered on units in courses above

and below. Bond and interlock each course of each width at corners, unless otherwise shown.

G. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

H. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces for set masonry, and remove loose masonry units and mortar prior to laying fresh masonry.

I. Built-In Work: As construction progresses, build-in items specified under this and other sections of the specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar.

2. Where built-in items are to be embedded in the cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

J. Non-Bearing Interior Partitions Walls: Build full height of story to underside of structure above, unless otherwise shown.

K. Mortar Bedding and Jointing:

1. Mortar Mixes: ASTM C 270, Proportion Specifications Type N.

2. Mix mortar ingredients for minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Do not use mortar which has begun to set, or if more than 1 hour has elapsed since initial mixing. Re-temper mortar during 1 hour period as required to restore workability.

3. Lay masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

4. Joints: Maintain joint width as shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 10 mm joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. Tool exposed joints slightly concave. Rake out mortar in preparation for application of caulking or sealant where shown.

5. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

L. Horizontal Joint Reinforcement:

1. Provide continuous horizontal joint reinforcement as shown and as specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 15 mm on exterior side of wall and 12 mm at other locations. Lap reinforcement a minimum of 150 mm at ends of units. Do not bridge control and expansion joints with reinforcing except at wall openings. Provide continuity at corners as well as wall intersections by using prefabricated L-sections and T-sections. Cut and bend unit as directed by manufacturer for continuity at returns, offsets, and other special conditions.

2. For single-width walls, space continuous horizontal reinforcement at 400 mm on center, unless otherwise indicated on Drawings.

3. Reinforce masonry openings greater than 300 mm wide, with horizontal joints

approximately 200 mm apart, above the lintel and below the sill of the opening. Extend reinforcement a minimum of 600 mm beyond jambs of the opening, bridging control joints where provided.

M. Control Joints:

1 Provide control joints in brick partitions, finished or unfinished at not more than 6 m on centers unless indicate otherwise on Drawings.

2 Control joints shall be vertical unbonded joints, maximum 9.5 mm wide, extending full height of the masonry work. Bond shall be broken with building paper placed against one face of joint with no mortar placed in continuous height of void.

3 Control joint material shall be expandable closed cell neoprene conforming to ASTM D 1056, 38 mm deep and 25 percent thicker before compression than joint width.

4 Top dress control joints with a sealant conforming to the requirements of Section 07900 - SEALANTS. Color of sealant shall be as selected and approved by the Engineer.

O. Anchoring Masonry Work:

1. Provide anchoring devices of types shown and as specified. If not shown or specified, provide standard type for facing and back-up involved.

2. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:

a Provide an open space not less than 12 mm in width between masonry and structural member, unless otherwise shown and keep space free of mortar or other rigid materials.

b Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless otherwise shown.

c Space anchors at no more than 600 mm on center vertically and 900 mm on center horizontally.

P. Lintels:

1. Provide masonry lintels where shown and wherever openings of more than 300 mm for brick size units and 600 mm for block size units are shown without structural steel or other supporting lintels.

2. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation.

3. Support formed-in-place lintels temporarily.

4. Unless otherwise shown, provide one reinforcing bar for each 100 mm of wall thickness and of a size number not less than three times the number of meter of opening width.

5. Provide minimum bearing at each jamb of 200 mm or as indicated on the Drawings.

3.2 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, cracked, broken, stained or

otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. During tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking sealant compounds.

C. Clean exposed concrete masonry units by dry brushing at the end of each day and after final pointing to remove mortar spots and drippings.

3.3 CURING

A. When temperature exceeds 25^{o}C and where construction of a masonry wall is complete, cure mortar by covering the wall unit with wet burlap, jute sack or similar material for a minimum of two days.

END OF SECTION

SECTION
ROOFING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Inverted roofing system and the integral accessories related to the system installation as indicated on Drawings and as specified herein.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials

ASTM C 495	Test Method for Compressive Strength of Lightweight Insulating Concrete
ASTM D 471	Test Method for Rubber Property - Effect of Liquids
ASTM D 570	Test Method for Water Absorption of Plastics
ASTM D 638	Test Method for Tensile Properties of Plastics
ASTM D 828	Test Method for Tensile Breaking Strength of Paper and Paperboard
ASTM D 1004	Test Method for Initial Test Resistance of Plastic Film and Sheeting
ASTM E 84	Test Method for Surface Burning Characteristics of Building Materials
ASTM E 96	Test Methods for Water Vapor Transmission of Materials
ASTM E 119	Test Method for Fire Tests of Building Construction and Materials
ASTM E 136	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750^{o}C
ASTM E 154	Test Method for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on walls, or as Ground Cover

1.3 SUBMITTALS

A. Product Data: Submit specifications, installation instructions, and general recommendations from the roofing materials manufacturer for each type of roofing product required. Include the manufacturer's data substantiating that the materials used are in compliance with the requirements.

B. Samples: Submit samples of each roofing system material for the Engineer's approval.

C. Shop Drawings: Submit complete shop drawings showing roof configurations and sheet layout, perimeter details as well as special conditions.

1.4 TRANSPORTATION, HANDLING AND STORAGE

A. Deliver materials in the manufacturer's unopened, labeled packing, and conform to the manufacturer's storage, handling, installation and protection requirements.

1.5 WARRANTY

A. Provide a written warranty, signed by the Manufacturer of the primary roofing materials and the Installer, agreeing to replace and repair defective materials and workmanship for a period of 10 years starting from date of substantial completion.

1.6 QUALITY ASSURANCE

A. Manufacturer: Provide primary products for the roofing system produced by a single manufacturer to the greatest possible extent. Provide secondary products which are acceptable to the manufacturer of primary products.

B. Installation: Work under this Section shall be performed by a specialized Sub-Contractor approved by the Engineer, recommended by the waterproofing membrane manufacturer, and having at least 10 years experience in successfully completed projects.

C. Thermal Resistance: Where thermal resistance properties of insulating materials are designated by the R-values they represent the rate of heat flow through a material of thickness indicated, measured by the test method included in the referenced material standard or as otherwise indicated.

D. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing according to the methods indicated below:

1. Surface Burning Characteristics: ASTM E 84 or equivalent standards.

2. Fire Resistance Ratings: ASTM E 119 or equivalent standards.

3. Combustibility Characteristics: ASTM E 136 or equivalent standards.

1.7 JOB CONDITIONS

A. Weather: Proceed with roofing work when the existing and forecasted weather conditions permit work to be performed in accordance with the manufacturer's recommendations and warranty requirements.

2. PART 2 - PRODUCTS

2.1 INVERTED ROOFING SYSTEM

A. Roof Screed: Lightweight concrete with Type 1 cement conforming to ASTM C896 with oven dry density of around 640 Kg/m³ when tested as per ASTM C 796, minimum compressive strength 2.8 MPa, when tested in accordance with ASTM C 796 or ASTM C 495 and water absorption of maximum 25% when tested as per ASTM C 796. Foaming agent shall be as recommended by the Manufacturer. Mix design shall be as recommended by the manufacturer and approved by the Engineer. Thickness as recommended by the manufacturer (but not less than 50 mm thick), and shall be applied to roof to maintain the required slope.

B. Roofing Membrane:

1. EPDM elastomeric sheet waterproofing: Refer to Section 07100 – WATERPROOFING.

2. Roofing Membrane Accessories shall include but not limited to the following:

a. Primer for Application to Concrete Surfaces: As recommended by the roofing membrane manufacturer.

b. Fillet: Use preformed extrusions of size as mentioned on Drawings, coated with self-adhesive compound to provide an angle fillet between walls and slab.

c. Mastic Sealer: Manufacturer's standard elastomeric compound, heated in accordance with manufacturer's installation procedure to seal waterproofing membrane around projections and irregularities such as gullies and small diameter openings.

C. Roof Thermal Insulation: Refer to Section 07210 -BUILDING INSULATION:

D. Separation Layer: Non-woven polyester fabric of a minimum density of 180 g/m² and to be laid above the roof insulation.

E. Protection Layer: High density polyethylene sheeting conforming to ASTM E 154, 250 microns (10 mils) thick. Similar material having a vapor permeance rating not more than 0.3 perm as determined by ASTM E 96, Procedure E will be considered suitable when approved by the Engineer.

F. Flashing Materials: Manufacturer's standard extruded aluminum system compatible with the roofing membrane.

G. Roof Topping: Provide one of the following roof toppings as indicated on Drawings:

1. Gravel Surfacing: Where indicated on Drawings, provide round edge pea gravel aggregates with diameter size of 15 - 30 mm, and total thickness of 50 mm only for areas shown on the Drawings.

2. Precast Concrete Tiles: Where indicated on Drawings, provide concrete tiles, manufactured by hydraulic pressing; an upper layer of minimum 10 mm thickness formed of 1-1 cement-sand mortar and a lower layer of 30 MPa concrete; and water absorption of maximum 5 percent. Tile shall have a smooth trowel finish. Tile size shall be as indicated on Drawings.

3. PART 3 - EXECUTION

3.1 GENERAL:

A. Roof waterproofing works shall be executed by a specialized Sub-Contractor recommended by the waterproofing membrane manufacturer and approved by the Engineer.

3.2 INVERTED ROOFING SYSTEM

A. Preparation of Substrate:

1. After completion and curing of roof screed, inspect condition of substrate to receive roofing system, and conditions under which work will be performed. Correct

unsatisfactory conditions including inadequate provisions in substrate for bonding roofing. Do not proceed with roofing work until unsatisfactory conditions have been corrected.

2. Install cant strips, fillets, and accessory items as indicated, or as recommended by the manufacturer even though not shown on Drawings.

B. Roofing Membrane Installation:

1. Installation Details: Perform external and internal corners, upstands, drainage and pipes penetrations strictly in accordance with details shown on the Drawings and as recommended by the manufacturer.

2. Substrate shall be smooth, hard dry and free from high spots and depressions. Substrate shall be swept clean and free from dust, loose cement scale, oil, grease, foreign substances and debris.

3. Starting at the low point of the slab, apply the waterproofing membrane loosely laid for horizontal areas with minimum 50 mm overlap. All the joints shall be welded with hot air.

4. On vertical areas, apply the UV stabilized waterproofing membrane fully adhered to exposed areas of parapet walls with minimum 50 mm overlap. Use waterproofing manufacturer's standard system for adhesion of the membrane. All the joints shall be welded with hot air.

5. Test roof membrane after completion by flooding 75 mm water height for a period of 48 hours.

C. Insulation Installation:

1. Comply with insulation manufacturer's written instruction for particular conditions of installation. Lay polyethylene sheet protection layer over waterproofing membrane prior to installation of insulation boards.

2. Extend insulation full thickness over entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projection interfering with placement.

3. Lay non-woven polyester fabric separation layer over insulation prior to installation of roof topping.

D. Roof Topping:

1. After completing waterproofing membrane, composite flashing and set-on accessories, as well as laying the insulation on each substantial area of roofing, cover the area with the separation layer.
2. Provide one of the following roof toppings as indicated on Drawings and as follows:

   a. Aggregate Surfacing: Loose-fill the surface with a uniform layer of pea gravel 50 mm thick.

   b. Concrete Tiles: Lay concrete tiles over 20 mm thick mortar bed.

3.5 PROTECTION OF ROOFING

A. Protect roofing upon completion of roofing work and during the remainder of construction period. At the end of construction, or at the time when remaining construction work will in no way affect or endanger the roofing, make a final inspection of roofing and prepare a written report describing the nature and the extent of deterioration or damage found in work.

B. Repair or replace the deteriorated or the defective work found at time of final inspection. Repair or replace the roofing and associated work to a condition free of damage and deterioration at time of substantial completion.

END OF SECTION

SECTION
LATH AND PLASTER

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Plaster accessories including metal lath and plastering beads as well as control joints.

B. Cement plaster

C. Gypsum Plaster

D. Sand-cement screed

E. Spray-Applied Acoustic Gypsum Plaster

1.2. REFERENCES

A. ASTM - American Society for Testing and Materials

ASTM A 109 - Specification for Steel, Carbon, Cold-Rolled Strip

ASTM A 570 - Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality

ASTM C 28 - Specification for Gypsum Plasters

ASTM C 29 - Test Method for Unit Weight and Molds in Aggregate

ASTM C 35 - Specification for Inorganic Aggregates for Use in Gypsum Plaster

ASTM C 61 - Specification for Gypsum Keene's Cement

ASTM C 150 - Specification for Portland Cement

ASTM C 206 - Specification for Finishing Hydrated Lime

ASTM C 472 - Test Method for Physical testing of Gypsum Plasters and Gypsum concrete

ASTM C 841 - Specification for Installation of Interior Lathing and Furring

ASTM C 842 - Specification for Application of Interior Gypsum Plaster

ASTM C 847 - Specification for Metal Lath

ASTM C 926 - Specification for Application of Portland Cement-Based Plaster

B. ANSI - American National Standards Institute Inc.

ANSI A42.1 - Gypsum Plastering

ANSI A42.3 - Lathing and Furring for Portland Cement and Portland Cement-line, Exterior (Stucco) and Interior

ANSI A42.4 - Specification for Interior Lathing and Furring

C. ML/SFA - Metal Lathing/Steel Framing Association

ML/SFA - Specification for metal lathing and furring

1.3. SUBMITTALS

A. Manufacturer's Certificates: Submit manufacturer's certificates showing compliance with the specified material requirements and installation and workmanship instructions.

B. Samples: Submit 300 mm long samples of the proposed accessories.

1.4. TRANSPORTATION, HANDLING AND STORAGE

A. Except for sand and water, deliver materials to the site in sealed containers or bags fully identified with manufacturer's name, brand, type and grade. Store materials in a dry, well-ventilated space, under cover, off the ground, and away from surface subject to dampness or condensation.

B. Deliver accessories in their original containers bearing the name of the manufacturer and item identification.

1.5. QUALITY ASSURANCE

A. Allowable Tolerance for Finished Work: For flat surfaces, do not exceed 3 mm in 3 meters for bow or warp of surface and for plumbness or level.

B. Mock-up Installation: Prior to installation of plaster work, provide sample mock-up panels using materials specified for final work. Build sample panels at site, of full thickness and approximately 1.2 x 1.2 m. Demonstrate the proposed range of color, texture and workmanship to be expected in the completed work, and submit to the Engineer for review. Retain sample panels construction as a standard for judging completed plaster work. Do not alter, move or destroy sample panel until plastering work is completed. Provide a sample panel for interior and exterior Portland cement plaster and plaster on metal lath.

1.6. JOB CONDITIONS

A. Protection:

1. General: Protect contiguous work from moisture deterioration and soiling, which may result from plastering operations. Provide temporary covering and whatever other provisions may be necessary to minimize harmful spattering of plaster on other work.

2. Finished door and window frames and other surfaces which do not receive a plaster finish shall be well protected during plaster application.

B. Environmental Conditions:

1. General: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic conditions to prevent rapid dry-out. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combination of these as required.

2. Ventilation: Provide adequate ventilation to properly dry interior plaster during and subsequent to its application.

2. PART 2 - PRODUCTS

2.1. PLASTER ACCESSORIES

A. Galvanized steel furring, lathing and other plaster accessories shall conform to the material provisions of ASTM C 841 and ANSI A42.3. Plaster accessories shall include but not limited to the following:

1. Metal Corner Beads: Fabricated from galvanized sheet, 5 mm radius bead with 38 mm wide expanded type flanges.

2. Strip Reinforcement: Smooth edge strips of expanded metal lath fabricated from galvanized steel sheet, with uncoated steel painted after fabrication.

3. Casing Beads: Square-edged style, with short or expanded flanges to suit kinds of plaster bases galvanized steel.

4. Curved Casing Beads: Square-edged style, fabricated from aluminum coated with clear plastic, preformed into curve of radius indicated on the Drawings.

5. Control Joints: Prefabricated, galvanized steel one-or two-piece type as required. Provide removable protective tape on plaster face of control joints.

6. Metal Corner Reinforcement: Expanded large mesh diamond lath fabricated from welded wire mesh from 1.2 mm diameter galvanized wire, specially formed to reinforce corners of Portland cement plaster where exposed while allowing full plaster encasement.

7. Expanded Metal Lath: Galvanized steel diamond mesh complying with ASTM C 847 and shall have a minimum weight of 1.85 kg/m².

B. Coordinate the depth of accessories with the thickness and number of plaster coats required in accordance with the manufacturer's recommendations and as directed by the Engineer.

2.2. PORTLAND CEMENT PLASTER

A. Portland cement plaster shall have a minimum thickness of 20 mm in a double coat provided using but not limited to the following materials:

1. Base Coat Cement: Portland cement, conforming to ASTM C 150, Type I.

2. Finish Coat Cement: Portland cement, conforming to ASTM C 150, Type I.

3. Factory-Prepared Finish Coat: Manufacturer's standard product requiring only the addition of water; white in color unless otherwise indicated.

4. Lime: Special hydrated lime for finishing purposes, conforming to ASTM C 206, Type S.

5. Sand Aggregate for Base Coat: Conform to the requirements of ASTM C 897.

6. Aggregate for Finish coat: Conform to ASTM C 897, manufactured or natural sand to match approved sample.

7. Water for Mixing and Finishing Plaster: Potable, free of substances, capable of affecting plaster set or of damaging plaster, lath or accessories.

8. Bonding Agents: Conform to ASTM C 932.

B. Portland cement plaster mixes and compositions:

1. General: Comply with ASTM C 926 for Portland cement plaster base and finish coat mixes as applicable to plaster bases, materials and other requirements indicated. Submit samples of materials used for the approval of the Engineer as well as mix design.

2. Base Coat: Proportion materials for respective base coats in parts by volume for cementitious materials and in parts by volume for sum of cementitious materials for

aggregates to comply with following requirements for each method of application and plaster base as required. Adjust mix proportions indicated herein within the limits specified to attain workability as follows:

a. Two-coat Work over Concrete or Unit Masonry: Base coats shall be one part Portland cement, 3/4 to 1-1/2 parts lime, 3 to 4 parts sand.

3. Finish Coat: Proportion materials for finish coats in parts by volume for cementitious materials for aggregates with one part Portland cement, 3/4 to 1-1/2 parts lime and 3 parts sand.

2.3. GYPSUM PLASTER (FOR INTERNAL PLASTERING)

A. Gypsum Plaster Materials:

1. Base Coat Plaster: Conform to ASTM C 28, ready-mixed gypsum, high strength gypsum neat plaster with minimum average dry compressive strength of 19.3 MPa according to ASTM C 472 for a mix of 45 kg plaster and 0.19 m^3 of sand.

2. Finish Coat Plaster: Ready-mixed gypsum finished plaster, manufacturer's standard mill-mixed gauged interior finish or high-strength gypsum gauging plaster, conforming to ASTM C 28, with a minimum average dry compressive strength of 34.5 MPa according to ASTM C 472 for neat mix.

3. Lime: Conform to ASTM C 206, hydrated lime, Type S, for finishing purposes, unless otherwise indicated.

4. Aggregates for Base Coat: Conform to ASTM C 35, sand aggregate, unless otherwise indicated.

5. Bonding Agent: Conform to ASTM C 631.

B. Gypsum plaster mixes and compositions:

1. Plaster Base Coat Compositions: Comply with ASTM C 842 and manufacturer's directions for gypsum plaster base coat proportions which corresponds to application and plaster bases as indicated below:

a. Three-coat Work over Metal Lath: Scratch and brown coats of high strength gypsum gauging plaster with job-mixed sand.

b. Two-Coat Work Over Unit Masonry and Concrete: Base coats of gypsum neat plaster with job-mix sand.

2. Finish Coat: Proportion materials for finish coat to comply with ASTM C 842 for type of finish coat and texture required.

2.4. SAND CEMENT SCREED

A. Sand cement screed be composed of a mixture of Portland Cement type I, natural sand, crushed stone or a combination of them, as well as water and other additives as indicated on Drawings and as required by the Engineer.

B. Submit the design mix for the Engineer’s approval. Screed shall have minimum thickness of 50 mm unless otherwise indicated on Drawings.

C. Test screed for a minimum compressive strength of 22 MPa after 28 days.

2.5. SPRAY-APPLIED ACOUSTIC GYPSUM PLASTER

A. Spray-Applied Plaster Materials:

1. Manufacturer's standard ready mix acoustic gypsum plaster consisting of retarded gypsum additives and light weight fibered aggregates and in accordance with the following requirements:

a. Plaster shall be ready to use by adding water only and shall be self curing.

b. Plaster shall be machine spray-applied to metal suspended ceiling system at a minimum thickness of 15 mm.

c. Texture of final finish shall be as approved by the Engineer.

B. Spray-Applied Plaster Mixes and Compositions:

1. Design and formulate the gypsum plaster mix to suit machine spray application in strict accordance with the plaster manufacturer recommendations.

2. Spraying equipment used and the nozzle for the selected texture as well as the application procedures shall be as recommended by the plaster manufacturer.

3. PART 3 - EXECUTION

3.1 INSTALLATION OF LATHING AND FURRING - GENERAL

A. Install interior lathing and furring materials indicated for plaster to comply with ASTM C 841.

B. Install lathing and furring materials indicated for Portland cement plaster to comply with ANSI A42.3.

C. Install supplementary framing, blocking, and bracing at terminations of work for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work in accordance with details indicated on Drawings or approved shop drawings.

D. Isolation: Where lathing and metal support system abuts building structure horizontally, and where partition/wall work abuts overhead structure, isolate the work from structural movement sufficiently to prevent transfer of loading into the work from the building structure. Install slip or cushion type joints to absorb deflections but maintain lateral support.

E. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

3.2 INSTALLATION OF CEILING SUSPENSION SYSTEMS

A. Coordinate installation of ceiling suspension system with installation of overhead structural systems, ducting and catwalks to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling hangers in a manner that will develop their full strength and at spacings required to support ceiling.

B. Furnish concrete inserts, and other devices indicated, to other trades for installations well in advance of time needed for coordination with other work.

C. Attach hangers to structure above ceiling to comply with ML/SFA - Specifications for Metal Lathing and Furring as well as with referenced standards.

D. Install ceiling suspension system components of sizes and spacings indicated but not in smaller sizes or greater spacings than that required by the referenced lathing and furring installation standards.

3.3 METAL LATHING

A. Install expanded metal lath for the applications where plaster base coats are required. Provide appropriate type, configuration and weight of metal lath selected from materials required which comply with referenced lathing installation standards.

3.4 INSTALLATION OF PLASTERING ACCESSORIES

A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and alignment during plastering.

B. Accessories:

1. Corner Beads: Install at external corners.

2. Casing Beads: Install at terminations of plaster work, except where plaster passes behind and is concealed by other work and where metal screed, bases or metal frames act as casing beads.

3. Control Joints: Install at locations indicated, or if not indicated, at spacings and locations required by referenced standard and recommended by plaster manufacturer and approved by the Engineer.

4. Corner Reinforcement: Install at external corners.

3.5 PLASTER APPLICATION

A. Prepare monolithic surfaces for bonded base coats and use bonding compound or agent to comply with requirements of referenced plaster application standards for conditioning of monolithic surfaces.

B. Tolerances: Do not deviate more than 3 mm in 3000 mm from a true plane in finished plaster surfaces, as measured by a 3000 mm straightedge placed at any location on surface.

C. Grout hollow metal frames, bases and similar work occurring in plastered areas, with base coat plaster material, and prior to lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout 150 mm lengths at each anchorage.

D. Sequence plaster application with the installation and protection of other work, so that neither will be damaged by the installation of the other.

E. Plaster finish with metal frames and other built-in metal items or accessories which act as a plaster ground, unless otherwise indicated. Where plaster is not terminated at metal by casing beads, cut base coat-free from metal before plaster sets and groove finish coat the juncture with metal.

F. Apply thickness and number of coats of plaster as indicated or as required by referenced standards, and as per manufacturer's recommendations.

1. Cement Plaster: Base coat shall be 20 mm thick for concrete and CMU. Finish coat shall be 3 mm.

2. Gypsum Plaster (for internal use): Base coat shall be 12 mm thick. Finish coat shall be 3 mm.

G. Concealed Plaster: Where plaster application will be concealed by wood paneling, above suspended ceilings and similar locations, finish-coat maybe omitted. Where plaster application will be concealed behind cabinets and similar furnishings and equipment apply finish-coat. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish-coat and coordinate thickness with overall dimension as shown and comply with tolerances specified.

3.6 SAND-CEMENT SCREED

A. Roughened the concrete slabs to receive screeding before hardening. Clean and wet the hardened base surfaces, preferably overnight prior to laying of screeds.

B. Batch accurately aggregates and cement by weight at a ratio of cement-aggregate ranging from 1-3 to 1-4.5. Mix screeding material mechanically.

C. Lay and finish the screed mix carefully to true levels and correct heights for the required thickness. Tolerance in level over a 2 m length shall not exceed plus or minus 3 mm.

D. Provide adequate means of curing to prevent rapid drying of screed as directed by the Engineer.

3.7 SPRAY-APPLIED ACOUSTIC GYPSUM PLASTER

A. Acoustic plaster shall be applied as per manufacturer's written recommendations.

3.8 CUTTING AND PATCHING

A. Cut, patch, point-up and repair plaster as necessary to accommodate other work and to restore cracks, dents and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry-outs, efflorescence, sweat-outs and similar defects and where bond to the substrate has failed.

B. Sand smooth-trowelled finishes lightly to remove trowel marks and arises.

3.9 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces which are not to be plastered. Repair floors, walls and other surfaces which have been stained, marred or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers and equipment and clean remove unused materials, containers and equipment and clean floors of plaster debris.

B. Provide final protection and maintain conditions which ensure plaster work being without damage or deterioration at the time of substantial completion.

END OF SECTION

SECTION
CERAMIC TILES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ceramic tiles for walls and/or floors as indicated on Drawings.

B. Miscellaneous materials including tile adhesive, grout, and sealants.

1.2 REFERENCES

A. ANSI - American National Standards Institute:

A108.1	Installation of Glazed Wall Tiles
A108.4	Ceramic Tiles Installed with Water-Resistant Organic Adhesives
A118.1	Dry-Set Portland Cement Mortar
A118.2	Conductive Dry-Set Portland Cement Mortar
A118.3	Chemical-Resistant, Water Cleanable Tile-Setting and Grouting Epoxy
A118.6	Ceramic Tile Grouts
E136.1	Organic Adhesive for Installation of Ceramic Tiles
A137.1-88	Specification for Ceramic Tiles

1.3 ASTM - American Society for Testing and Materials:

ASTM C 1027-90	Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tiles.
ASTM C 1028-89	Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other like Surfaces by the Horizontal Dynamometer Pull Meter Method
ASTM C 241-90	Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
ASTM C 648-94	Standard Test Method for Breaking Strength of Ceramic Tile.
ASTM C 373-94	Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products.
ASTM C 150	Specification for Portland Cement
ASTM C 206	Specification for Finishing Hydrated Lime

1.4 TCA - Tile Council of America:

TCA 137.1 Standard Specification for Ceramic Tile

TCA Handbook for Ceramic Tile Installation

1.3 SUBMITTALS

A. Complete set of samples of manufacturer's standard products for color selection.

B. Certification from manufacturer of tile certifying the following:

- Materials provided are suitable for intended use.
- Materials meet or exceed appropriate ANSI Standard or SASO Standard.

C. Tile manufacturer's complete installation instructions.

D. Shop drawing layout showing the tile arrangements.

1.4 TRANSPORTATION, HANDLING AND STORAGE

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken. Store material so as to prevent damage or contamination.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tiles of same type and color or finish from one source or producer.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each adhesive, and grout component from a single manufacturer.

C. Mockups: Build mockups for the approval of the Engineer to verify qualities of materials and execution**.** Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Variation in plane of sub-floor, including concrete fills: Not more than 6 mm in 3 meters from required elevation where Portland cement mortar setting bed is used and not more than 3 mm in 3 meters where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical resistant bond coats are used.

E. Variation in plane of wall surfaces and surface of scratch coat: Not more than 6 mm in 2.40 meters from required plane where Portland cement mortar setting bed is used and not more than 3 mm in 2.40 meters where dry-set or latex-Portland cement mortar or organic adhesive setting materials are used.

2. PART 2 - PRODUCTS

2.1. GENERAL::

A. Type, Size, Texture, Color and Pattern: Refer to I.D. drawings and specifications for selections of ceramic tiles.

2.2. CERAMIC TILES

A. General:

1. Ceramic tiles shall have a standard grade quality in accordance with the Grade Specifications of ANSI A137.1 or DIN 18166 or BS 1286 or SASO 1031.

2. Unless otherwise indicated, minimum requirements for ceramic wall and floor tiles shall be Grade-1, best quality glazed tiles, 6 mm thick for walls and 8 mm thick for floors.

3. Accessories: Provide the necessary manufacturer's standard trims and half pieces required for the complete installation.

4. Selection and Size: Type, color and pattern shall be as indicated on Drawings unless otherwise approved by the Engineer.

B. Physical Properties:

1. Breaking strength: 41 kg for wall tiles and 113 kg for floor tiles.

2. Water absorption: Less than 0.5 %

3. Coefficient of Friction (COF): 0.5

2.3. MISCELLANEOUS MATERIALS

A. Adhesive and Grout:

1. Tile Adhesive: Shall be white cement-based polymer modified ready-mixed powder adhesive conforming to BS 5980:1980, Type 1, Class AA, or equivalent standards. Use 3-6 mm bed thickness mixed with admixture as per manufacturers written recommendations.

2. Grouting Material: Shall be cement-based polymer modified ready-mixed powder conforming to BS 5750: Part 2 or equivalent standards. Use grout with admixture as per manufacturers written recommendations. Color of grout shall be as approved by Engineer.

B. Sealants: Elastomeric type, in conformance with the requirements specified in Section 07900 -

SEALANTS.

3. PART 3 - EXECUTION

3.1 GENERAL

A. Installation of floor and wall tiles shall comply with the requirement of ANSI A108.1 through A108.6 and the TCA **Handbook for Ceramic Tile Installation**, unless otherwise indicated.

B. Protection and Curing:

1. Spaces in which tile is being set shall be closed to traffic and other work. Keep closed until tile is firmly set. Protect tile from damage.

2. Damp cure for at least 3 days; add dampness as needed to achieve a hard cure.

C. Jointing Pattern:

1. Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are the same size. layout tile work and center tile fields both directions in each space or on each wall area. Adjust as necessary to avoid use of widths less than 1/2 tile at edge of walls. Provide uniform joints, not less than 5 mm and not more than 7 mm unless otherwise shown.

3.2 INSTALLATION OF WALL TILES

A. Ceramic tiles on concrete and CMU walls shall be installed with tile adhesive on cured cement plaster. Tiles shall not be soaked prior to installation.

B. Tiles shall be pressed firmly into freshly notched 3 to 6 mm thick tile adhesive and shall be tapped and beaten to a true surface.

C. Joint width shall be determined by spacers on tile or by strings or pegs if tile without spacers are used.

D. Tiles shall be pressed and beaten into place to obtain full coverage by adhesive on back.

E. Tiles shall be adjusted before initial set of adhesive takes place.

F. Grouting Wall Tiles: Grouting shall be in strict accordance with the manufacturer's recommendations and shall be cured as required to produce a hard grout.

3.4 INSTALLATION OF FLOOR TILES

A. Install tiles with adhesive 3 - 6 mm thick tile adhesive as per manufacturer's written recommendations over Portland cement screed sloped to drains, not less than 20 mm thick and not more than 30 mm thick.

B. Press tiles firmly into the adhesive to obtain full contact with adhesive with no voids.

C. Grouting Floor Tiles: Grouting shall be in strict accordance with the manufacturer's recommendations and shall be cured as required to produce a hard grout.

3.5 CLEANING AND PROTECTION

A. Upon completion of placement and grouting, all ceramic and quarry tiles surfaces shall be cleaned free of foreign matter.

1. Glazed tiles surfaces shall be sponged and washed thoroughly diagonally across joints and finally polished with clean, dry clothes.

2. Unglazed tiles may be cleaned with cleaners and/or solvents recommended by tile manufacturer after completion of installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of cleaning materials. Flush and surface with clean water before and after cleaning.

B. Finished installation shall be left clean and free of cracked, chipped, broken, unbonded or otherwise defective tile work.

C. Apply a protective clear sealer coat(s) for unglazed tiles. Number of coats shall be as recommended by manufacturer. Protect installed tile work with Kraft paper or other heavy covering during the construction period to prevent damage.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

E. Seal plumbing and electrical penetrations through wall tile as specified in Section 07900 - SEALANTS.

END OF SECTION

SECTION
PORCELAIN TILES

PART 1-GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, tools, equipment and services necessary for an reasonably incidental to complete the tile work as shown on the drawings or specification.
B. Related documents, drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification section apply to work of this section.
C. Related Sections:
   1. Division 7, sealing expansion joints and other joints in tile work(joint sealant types, colors and manufactures to be specified by Architect).
   2. Division 3, concrete.

1.2 REFERENCE STANDARDS

A. Comply with the following current edition of:
   1. American Society for Testing and Materials (ASTM)
   2. American National Standards Institute (ANSI).
   3. Tile Council of America (TCA) Handbook for Ceramic Tile Installation.

1.3 QUALITY ASSURANCE

A. Provide tile materials of each type, color and finish from Granito, RAK, Niro Granite provide setting, grouting and related materials of each type, color and finish obtained from one source.
B. Deliver, store and handle materials in accordance with manufacturer's instructions.
C. The contractor, by commencing the work of this section, assumes overall responsibility to assure that all assemblies, components and parts shown or required within the work of this section comply with contract documents and are compatible with each other and with the conditions and expected use.
D. Installer Qualification: Engage and installer with a minimum of five(5) years commercial tile installation similar in material, design and scope to that indicated.
E. Pre-Installation Meeting: Prior to tile installation, conduct a pre-installation project meeting. Contractor, Subcontractor, Material Suppliers, Architect and Owner representative shall be notified of the meeting.

F. Field mock –up: Install a fully finished mock-up for each type tile installation. Mock-up shall be a minimum of 6'-0" x 6'-0" and will be reviewed for joint quality, color range, pattern and workmanship.
G. Extra Stock: Furnish extra stock of quantity equal to 3% of amount installed, in full-size units, for each type, color, size and finish of tile.

1.4 SUBMITTALS

A. Verification Samples: Submit the following for each type, color, size and finish included in the work.
   1. Full size tile and trim shapes.
   2. Grout color samples.
   3. Sealant color samples.

B. Product and Installation Data:

   1. Porcelain tile manufacturer's product and technical data indicating compliance with applicable standard herein.
   2. Motor and grout manufacturer's technical data sheets indicating suitability for the installation specified and compliance with applicable standard.
   3. Sealant manufacturer's product and technical data.

1.5 ENVIRONMENTAL

A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during and after installation.
B. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
C. Maintain minimum and maximum temperature limits as recommended by manufacturers.
D. Protect adjacent surface during progress of the work in this section.
E. Illuminate the work area during installation providing the same level and angle of illumination as will be available for final inspection.

2.1 GENERAL REQUIREMENTS

A. Furnish tile complying with "Standard Grade" requirements per ANSI A 137.1 for types of tile indicated.
B. Comply with ANSI Standard for Tile installation Material for products and materials indicated for setting and grouting.

2.2 TILE

A. Porcelain tile shall be procured from the following brands after approval from the Engineer/Employer:
   i. Granito ii. RAK iii. Niro Granite
1. Size: 24" x 24" inches normal
2. Trim: As indicated on drawings.
3. Type and Finish: textured and glazed.

4. Color: To be from _____full range of colors available. For bidding purposes allow 90% to be chosen within price groups I and II 10% from price group III.
5. Product Test Data:

PORCELAIN – TECHNICAL PROPERTIES

	NAME OF POST	ASTM	REQUIREMENT
a.	Water Absorption	C373	0.5% Maximum
b.	Abrasive Wear	C501	100 minimum
c.	Breaking Strength	C648	250Lbs. Minimum
d.	Bond Strength	C482	50 Minimum
e.	Coefficient of friction- Dry	C1028	.6 Minimum
f.	Coefficient of friction- Wet	C1028	.6 minimum
g.	Facial Dimensions (Range)	C499	1.5% maximum
H.	Range of Thickness	C499	0.040
I.	Warpage (Diagonal)	C485	+/- 0.75 Maximum
j.	Wedging	C502	1.00% Maximum
k.	Scratch Hardness	C373	7/8

6. Provide matching trim shapes such as bull-nose, coroners and cove base when specified.

2.3 SETTING AND GROUTING MATERIALS:

A. Latex-Portland Cement Mortar ANSI A118.4.

B. Latex-Portland Cement Grouts. ANSI A1 18.6.

2.4 EXPANSION JOINTS, CONTROL, CONTRACTION, AND ISOLATION JOINTS:

A. Refer to TCA Handbook, Method EJ171-99 for recommendations on locating and detailing various types of construction joints. NOTE: Architect must specify expansion joints and show location and details on drawings.

B. Use sealants complying with ASTM C920 according to Type, Grade, Class and Uses required.

C. Provide marble threshold trim strips, or other metal edging material where tile terminates at dissimilar finishes as shown or specified.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates where tile will be installed for compliance with requirements for installation tolerances and other conditions effecting performance of installed tile. Verify that substrates for setting tile are well cured, dry, clean and free from oil or waxy films and curing compounds.
B. Do not proceed with installation until unsatisfactory conditions have been corrected. Commencement of work signifies acceptance of substrate and installation conditions.

3.2 PREPARATION

A. Substrate preparation: Repair and clean substrate in accordance with installation standard and manufacturer's instructions, and as follow:
1. Remove protrusions, bumps and ridges by grinding of chipping.

2. Repair, fill and level cracks, holes, depressions and rough or chipped areas in substrate using patching material recommended by setting materials manufacturer.

3. Concrete slab to have steel trowel and broom finish when tile is installed by the thin –set method.

4. insure substrate is within the following tolerance:

a. horizontal surface (floors) – Maximum variation in substrate shall not exceed 1/8" in ten feet from required plane: ¼ in ten feet when substrate is recessed or depressed to receive full mortar bed.

b. vertical surface (walls) – Maximum variation in substrate shall not exceed 1/8" in eight feet from required plane.

B. Jobsite Blending: Blend tiles before installing, in accordance with reference standard, to produce an even range and distribution of color and finish.

3.3 INSTALLATION

A. Manufacturer's Instructions: Perform work in compliance with instructions and with setting materials manufacturer's instructions.

B. General installation standards: install tile in accordance with ANSI standards and appropriate TCA methods.

1. Thin-set Floor Installations: TCA Method F 113-2K.

2. Thin-set Wall Installations: TCA Method W243-2K

C. Installing Tile:

1. Install tile in pattern indicated. Align joints when adjoining tiles on floor, base, walls and trim are same size. Center tile fields in both directions, adjust to minimize tile cutting and to avoid tile less than half size.

2. Grind cut edges of tile. Provide straight cuts which align with adjacent materials.

3. Extend tile into recessed and under equipment and fixture to form a complete covering without interruption.

4. Terminate tile neatly at obstructions, edges and corners, without disruption of pattern or joint alignment.

5. Provide tile joint uniform in width, subject to variance in tolerance allowed in tile size. Make joints smooth and even, without voids, cracks, or excess grout. Maximum joint size ¼" preferably 1/8: joint.

6. Max mortar in strict accordance with manufacturer's recommendations.

7. Apply setting material in accordance with manufacturer's directions and install tile before mortar has started initial cure. When installing unglazed paver tile up to 12" x 12" in size, the notch trowel used should be minimum of ¼" x 3/8" x ¼". For larger unit tiles use a nominal 3/8" x 9/16" x ¾" round notch trowel.

8. Do not spread more material than can be covered within 10 to 15 minutes maximum. If skinning occurs, remove mortar and spread fresh material. Spread mortar with notches running in one direction.

9. Place tile in fresh mortar, press, push and pull the tile in to achieve as near 100% overage and contract of tile with setting material and substrate as possible. The coverage shall be sufficiently distributed to give full support of the tile. Make sure that all corners and edges are well backed with mortar. Leave no hallow corners or edges. NOTE: The 100% coverage is particularly important for wet or exterior areas or areas with heavy or traffic.

10. Ensure there is a minimum 3/32" mortar between tile and substrate after tile has been beaten into place.

11. Use a beating block and mallet so that faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.

D. Grouting:

1. Install grout in accordance with ANSI A108.10 and manufacturer's recommendations.

2. Mix grout material in strict accordance with manufacturer's directions.

3. Apply grout to produce full, smooth grout joints of uniform width, even with edge of titles ad free of voids and gaps.

4. Before grouting entire area, do a test area, to assure there will be no permanent staining or discoloration of the tile. If necessary, precoat exposed surface of tile with a grout release as recommended by the manufacturer.

5. Cure all setting and grouting materials in accordance with manufacturer recommendations.

E. Cleaning and Protection:

1. Remove grout release and clean tile surface so they are free of grout residue and foreign matter, in accordance with manufacturer's instructions. Flush surface with clean water before and after cleaning. Do not use acid or acid-based cleaners to clean glazed tiles or tile grouted with latex modified grout.

2. When applicable, acid cleaning of tile grouted with Portland cement grout shall not be done before 10 days after grouting. Tile and grout shall be soaked with water before cleaning. In the absence of a recommendation from the grout manufacturer, acid cleaning may be done with a started solution of sulfamic acid, mixed in accordance with manufacturer's recommendations and ANSI A108.

3. After cleaning, provide protective covering and maintain conditions to protect tile work from damage or deterioration. Where tiled surface will be subject to equipment or wheel traffic or heavy construction traffic, and during move-in of furniture and equipment, cover protective covering with ¼" hardboard or plywood.

4. Final clean up shall be done by finishing or polishing with a terry cloth, cheesecloth, or similar pad.

5. Leave finished installation clean and free of cracked, chipped, broken, unbonded and otherwise defective tile work.

END OF SECTION

SECTION
TERRAZZO (PRECAST)

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work under this Section consist of furnishing and installing all precast terrazzo tiles and poured in place terrazzo treads and risers as shown on drawings and as specified herein.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials:

ASTM A 815 Welded Steel Wire Fabric for Concrete Reinforcement

ASTM C 33 Concrete Aggregate

ASTM C 150 Portland Cement

ASTM C 241 Abrasion Resistance of Stone Subjected to Foot Traffic

ASTM C 309 Liquid Membrane-Forming Compounds for Curing Concrete

B. NTMA - National Terrazzo and Mosaics Association

NTMA Terrazzo Design Data Book

NTMA Terrazzo Technical Data Book

1.3 SUBMITTALS:

A. Product Data: Manufacturer's technical information and installation instructions for type of terrazzo, accessory items and materials.

B. Samples: Manufacturer's samples for each kind of precast terrazzo for Engineer's approval.

C. Shop Drawings: Show layout of divider strips, control, joint strips, base and border strip.

D. Certificate of compliance.

1.4 TRANSPORTATION, HANDLING AND STORAGE:

A. Handling: Separate precast units during shipment with polyethylene film or other non staining protective separator material.

B. Protection: Protect terrazzo work against damage throughout the construction period.

1.5 QUALITY ASSURANCE:

A. Reference Standards: Comply with specified provisions and recommendations of National Terrazzo and Mosaic Association Inc. (NTMA).

2. PART 2 - PRODUCTS

2.1. TERRAZZO FLOORING:

A. Precast Terrazzo Tiles: Terrazzo shall consist of natural, sound, crushed marble chips without excessive flats or flakes, with colors as selected from manufacturer's range of colors. Chips shall be a mixture of sizes 6 mm (No. 1) - 10 mm (No. 2) of equal parts. Matrix shall be either white or colored cement. Marble chips shall have a dust content of less than 1% by weight and shall have an abrasion resistance of not less than HA10 in accordance with ASTM C241. The mix shall consist of 3 parts of marble chips to one part of cement by weight. The facing layer shall provide a minimum wearing thickness of 6 mm after grinding. Terrazzo bases (if required) shall be from the same mix, and shall be 100 x 20 mm thick, unless indicated otherwise on the drawings. Sizes shall be as indicated on drawings.

B. Poured in Place Terrazzo Floor: Same composition as precast terrazzo tiles.

2.2. DIVIDER STRIPS (WHERE REQUIRED):

A. Divider strips, where required, shall be of white alloy zinc or half-hard brass, angle or "T" type for adhesive bonding to substrate.

2.3. SEALER:

A. Interior floor penetrating sealer shall be colorless, slip and stain resistance which will not affect color and physical properties of terrazzo surface.

2.4. COLORANTS (IF REQUIRED): Alkali-resistant color stable pigments.

2.5. CLEANER:

A. pH factor between 7 and 10.

B. Shall not discolor or amber.

C. Biodegradable and phosphate free.

2.6. CURING MATERIALS: Water, Wet Sand, or Polyethylene Sheeting.

2.7. MORTAR AND GROUT:

A. Materials shall conform to ANSI A108.1 and A108.2. Mixture of Portland cement and sand for floors shall be roughly in proportions of 1:6, and for walls shall be Portland cement, sand, and hydrated lime in proportions of 1:5:1/2 to 1:7:1.

3. PART 2 - EXECUTION

3.1 UNDERBED:

A. Underbed shall be composition of one part Portland cement to 4 to 5 parts sand with sufficient

water to provide workability at as low a slump as possible.

B. Bed shall be screeded to a level true plane, pitching to drain where required.

3.2 INSTALLATION OF PRECAST TERRAZZO TILES:

A. Precast units shall be set on underbed.

B. Joints shall be raked to depth of at least 19 mm and shall be pointed with a grout matching the color of the matrix.

C. Final installation shall be level and true to grade without projecting edges and corners.

3.3 INSTALLATION OF POURED IN PLACE TERRAZZO:

A. Underbed:

1. Thoroughly saturate concrete substrate with water, slush and broom with neat cement slurry.
2. Place concrete underbed.
3. Screed underbed to 13 mm below finished elevation or slope.
4. Install divider strips as shown on drawings in semi-plastic underbed.

B. Placing Terrazzo

1. Slush underbed with neat cement slurry same color as specified for the topping.
2. Broom slurry into underbed surface.
3. Place terrazzo mixture in panels formed by divider strips as detailed on drawings. Trowel mixture to level of top of strips.
4. Roll and compact surface until excess cement and water has been extracted.
5. Trowel to a dense uniform flat surface disclosing lines of divider strips.

C. Curing:

1. After completing placement of terrazzo and composition has sufficiently set, cover with water, wet sand or polyethylene sheeting.
2. Cure until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.

D. Finishing:

1. Rough Grinding:
   a. Grind with 24 or finer grit stones or with comparable diamond plates.
   b. Follow initial grind with 80 or finer grit stones.
2. Grouting:
   a. Cleanse terrazzo with clean water and rinse.
   b. Remove excess rinse water and hand apply grout using identical Portland cement, color pigments as used in topping, taking care to fill voids.
3. Cure Grout.
4. Fine Grouting:

a. Grind with 80 or finer grit stones until all grout is removed from surface.

b. Upon completion, terrazzo shall show minimum of 70% of marble chips.

3.4 CLEANING, SEALING AND PROTECTION:

A. Clean terrazzo after installation and finishing operation are completed, complying with sealer manufacturer's instruction.

B. Apply sealer to cleaned terrazzo surfaces in accordance with the sealer manufacturer's instruction.

C. Protect terrazzo from damage and wear during construction operation.

D. When building is ready for occupancy, clean and machine buff terrazzo as recommended by the sealer manufacturer.

END OF SECTION

STONEWORK

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Marble for floors, wall, base, countertops, thresholds and accessories including matching base.

B. Granite for floors, wall, base and countertops including matching base.

C. Granite for external paving, steps, banding and edging.

D. Anchors and attachments, setting materials, grouts, and accessories related to stone works.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for the type of stone as well as accessories and other manufactured products required.

B. Samples: Submit samples in the form of sets for each color, grade, finish, type and variety of materials required. Sample size shall be 600 x 600 mm. Include 2 or more samples in each set showing full range of variations in appearance and characteristics to be expected in the completed work also submit samples of fixing devices and joint sealants for the approval of the Engineer.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect stone, mortar materials and accessories during storage and construction against moisture, soiling, staining and physical damage.

B. Handle stone in a manner to prevent chipping, breakage, soiling or any other damage.

C. Store stone on wood skids or pallets covered with a waterproof non-staining membrane.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each color, grade, finish, type and variety of stone from a single quarry, approved by the Engineer.

B. Execute the work under this Section through a specialized firm approved by the Engineer and having at least 5 years experience in successful projects.

2. PART 2 - PRODUCTS

2.1 MARBLE

A. General: Type, Color, Texture, Size and Finish of Marble: Refer to I.D. drawings and specifications for selections of marble stones.

B. Marble - Marble for flooring shall be cut from sound stock with even texture, shade, marking, free from imperfections and as approved by the Engineer.

1. Nominal Thickness: 30 mm thick unless otherwise indicated on drawings.

2. Provide marble cut from sound stock with even texture, shade and marking, and free from imperfections.

3. Finish: Polished.

C. Marble for Wall Cladding and Bases : (Unless otherwise indicated on Drawings, marble shall be 20 mm thick, length and width dimensions of individual slabs within plus or minus 1 mm, thickness within 2 mm from those specified.

D. Marble for Stair Treads and Risers: Unless otherwise indicated on Drawings, marble shall be 30 mm for treads with non-slip nosing and 20 mm for risers.

E. Marble for Countertop: Unless otherwise indicated on Drawings, countertops shall be 30 mm thick with 20 mm thick apron and backsplash, as shown on Drawings.

F. Marble for Thresholds: Unless otherwise indicated on Drawings, thresholds shall be not less than 30 mm thick with dimensions as shown on Drawings.

2.2 GRANITE

A. Granite - General:

1. Type, Size, Color, Texture and Finish: Refer to I.D. drawings and specifications for selection of granite stones.

2. Provide granite of the highest density available for the particular type selected, free from imperfections and even texture.

3. Obtain granite from one quarry with consistent color range and texture throughout the work.

4. Nominal Thickness: 20 mm thick unless otherwise indicated on drawings.

5. Provide granite cut from sound stock with even texture, shade and marking, and free from imperfections.

B. Provide granite to the shapes and sizes indicated on the Drawings with length and width dimensions of each individual slab within plus or minus 1 mm and thickness within 2 mm from those specified.

C. Unless otherwise indicated, granite tiles thickness for wall cladding bases and floor tiles shall be 20 mm.

D. Granite for stair treads and risers shall be of sizes as indicated on Drawings, thickness not less than 30 mm for treads with non-slip nosing and 20 mm for risers.

E. Granite for external paving and edging for precast concrete pavers shall be not less than 20 mm thick except for driveways which shall be 30 mm thick laid over 150 mm thick cast-in-place reinforced concrete base. For banding and edging where shown on drawings, granite shall be 20 mm thick.

F. Granite for Counter Tops and Cladding: Unless otherwise indicated on Drawings, countertops shall be 30 mm thick with exposed edges rounded and polished; and minimum 20 mm thick for cladding, as shown on Drawings.

G. Granite shall be laid with matching grain and color and pattern shown on drawings.

2.3 LASBELLA STONE

A. Description Beige hard stone, 97 percent or more calcium carbonate. Type, texture, color, size

and pattern shall be as shown on drawings and approved by the Engineer. Physical properties shall include:

1. Density: Not less than 2000 kg/cm^3.

2. Modulus of Rupture: Tested in compliance with ASTM C99-90, minimum 300 kg/cm^2.

3. Water Absorption: Tested in accordance with ASTM C97-90, maximum 1.5 percent.

4. Abrasion: Tested in compliance with DIN 100/52, maximum 12 cm^3/5cm^2.

5. Dimension: As indicated on drawings.

2.4 MISCELLANEOUS MATERIALS

A. Setting Materials:

1. Portland Cement: ASTM C 150, Type I, except complying with staining requirements of ASTM C 91 for not more than 0.03 percent water soluble alkali.

2. Hydrated Lime: ASTM C 207, Type S.

3. Aggregate: ASTM C 144, non-staining, except graded with 100 percent passing the No. 16 sieve for 6 mm and narrower joints.

   a. For white pointing mortar and grout, use natural white sand or ground white stone.

   b. For colored aggregate pointing mortar and grout, use fine aggregate produced from natural sands or ground stone including marble, granite or other sound stone as selected to produce mortar color indicated.

4. Water: Potable, clear and free from deleterious materials which would impair the work.

B. Grouts:

1. Ready mixed, cement based, consisting of cement, carefully selected fillers and additives to provide workability. Grouts shall have good adhesion to dry stone pieces and shall be so formulated to avoid drying, shrinkage and cracking.

   Mixing shall be in accordance with the manufacturer's instructions. Color and shade of grouts shall be as directed by the Engineer.

A. Control Joints:

1. Form control joints to allow for movement in the floor at locations recommended by the manufacturer or as directed by the Engineer. Fill control joints with elastomeric material recommended by the manufacturer. No control joints material shall be allowed to project above the finished surface level.

B. Anchors and Attachments:

1. Provide required anchors and attachments of type and size to support the tiles from the following metals for conditions and anchors indicated below:

   a. Stainless Steel for Wall Cladding: Type 304, for anchors, dowels and clamps in

direct contact with stone.

b. Cast or Malleable Iron: For adjustable inserts embedded in concrete and not in direct contact with stone.

c. Hot-Dip Galvanized Steel: For anchor bolts, nuts and washers not in direct contact with stone; comply with ASTM A 307, Grade A, for material and ASTM C 153, Class C for galvanizing. For steel plates shapes and bars not in direct contact with stone; comply with ASTM A 36 for material and ASTM A 123 for galvanizing. Fixing devices shall be provided by a specialized firm as approved by the Engineer.

2. Dove-tail Slots: Where indicated, furnish dove-tail slots with filler strips, of slot size required to receive anchors provided, fabricated from gage 22 galvanized sheet steel complying with ASTM A 446, Designation G-90.

C. Accessories:

1. Setting Buttons: Resilient plastic buttons, with no staining effect on the tiles, sized to suit joint thickness and bed depth of stone work involved without intruding into required depths of joint sealants or causing third-side adhesion between sealant an setting button.

2. Sealer for Floors: Colorless, slip and stain resistant sealer which will not affect color or physical properties of stone surface, as recommended by sealer and by stone manufacturer for application indicated.

3. Cleaner: Provide cleaners of proper formulation for kinds of stone, finishes and applications indicated, as recommended by the stone manufacturer and if sealer specified by sealer manufacturer. Do not use acid-type cleaning agents or other cleaning compounds containing caustic or harsh fillers except where expressly approved by the stone manufacturer for type of condition involved.

2.5 FABRICATION

A. Fabricate as shown and as detailed on approved shop drawings. Provide holes and sinkages, cut or drilled for anchors, fasteners, supports and lifting devices, as shown and as necessary to secure stone work in place.

B. Contiguous Work: Provide reveals, openings and similar spaces and features as required for contiguous work also coordinate with Drawings and approved shop drawings showing contiguous work.

C. Cut accurately to shape and dimension shown on the shop drawings. Dress joints straight and at right angles to face, unless otherwise indicated. Cut to provide joint width as shown on the Drawings or as directed by the Engineer. Field cutting is not allowed.

D. Pattern Arrangement: Fabricate stone to the patterns indicated on Drawings and in accordance with approved shop drawings.

3. PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Clean stone before setting by scrubbing with fiber brushes and thoroughly drenched with water.

B. Stone work shall be done by experienced workmen of the trade employing skilled stone fitters at

the site for necessary field cutting as stone is set.

C. Where stone will come in contact with ferrous metal surfaces, apply an approved anti-corrosion paint on the metal surfaces prior to setting as well as using approved rust inhibitors as pre-primers after primary preparation.

D. Set stone work in accordance with Drawings and approved shop drawings for the stone work and provide expansion joints where required.

E. Do not use stone units with chips, cracks, voids, stains or any other defects that might be visible in the finished work.

F. Expansion and Control Joints: Provide for expansion and control joints of width and at locations indicated, sealant material complying with the requirements of Section 07900 - SEALANTS.

3.2 INSTALLATION - WALL CLADDING

A. Support each stone with both gravity and lateral anchors of type and number indicated complying with the requirements indicated for material and performance.

B. Attach anchors securely to stones and to back-up surfaces. Attach framing for stone support system to structural frame of building at connection points indicated by welded or bolted field connections.

C. Where required, fill anchor holes with mortar and where dowel holes occur at pressure-relieving joints, provide compressive material above and below dowels.

D. Install concealed flashing at continuous shelf angles, lintels, ledges and similar obstructions to the downward flow of water so as to divert such water to the exterior.

E. Keep cavities open where unfilled space is indicated between back of stone and back-up wall. Do not fill cavities with mortar or grout unless otherwise indicated or directed by the Engineer.

F. Upon completion of work, apply joint sealants as per instructions and at locations shown on Drawings and as specified in Section 07900 - SEALANTS.

3.3 INSTALLATION - FLOORS

A. Setting of Floors in Portland Cement Mortar Bed:

1. Saturate concrete subfloor with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

2. Apply slush coat of cement grout over surface of concrete subfloor about 15 minutes prior to placing of setting bed. Limit area to avoid its drying out prior to placing of setting bed. Slush coat shall be properly mixed and shall not exceed the thickness of 1.5 mm.

3. Mix setting bed in proportions by volume of one part of cement to 3 parts of sand (measured in damp loose condition) to the quantity of water to produce a stiff mixture with a moist surface when setting bed is ready to receive flooring.

4. Spread and screed setting bed to uniform thickness indicated to produce sub-grade elevations required for accurate setting of tiles to finished floor elevations shown. Mix and place only the amount that can be covered with prior to initial set. Cut back, bevel edge, remove and discard setting bed which has reached initial set prior to the placing of tiles.

5. Butter backs of flooring units with skim coat of neat cement and water just prior to placing it on bed.

6. Tamp flooring units until firmly bedded to proper finished floor elevations indicated also set and level each unit in single operation. Do not return to areas already set and disturb for leveling purposes prior to initial set of cement bed.

B. Grouting - Floors

1. Mix grout in proportion, by volume of one part Portland cement to 2 parts fine aggregate (measured in damp loose conditions). Except for thin joints with fine sand, reduce fine aggregate proportion to one part. Add liquid admixtures in proportion and concentration as per manufacturer's recommendations. Select grout materials to match the approved samples.

2. Grout joints in flooring units, except at expansion and control joints indicated to be filled with sealant. Fill all gaps to produce a finished joint which is uniform in color, smooth and without voids, pinholes or low spots.

3. Remove grout spillage from face of stone as the work progresses.

4. Cure grout by maintaining in a moist condition for not less than 7 days.

3.4 REPAIR AND CLEANING

A. Units which are broken, chipped, stained or otherwise damaged shall be removed and replaced.

B. Clean stone work after completion using clean water and stiff bristle brushes. Do not use wire brushes, acid type cleaning agents or compounds with caustic or harsh fillers.

C. Apply sealer to cleaned interior flooring in compliance with sealer manufacturer's instructions.

3.5 PROTECTION

A. Provide proper procedures to protect the stone work from collapse, deterioration, discoloration or damage during construction and until the acceptance of work.

END OF SECTION

SECTION
SPAINTING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Painting materials complete with primers, sealers, stains applied for exterior and interior areas as indicated on Drawings and as specified herein.

1.2 REFERENCES

A. FS - Federal Specifications

P-W-158E - Wax, General Purpose, Solvent Type

TT-E-489G - Enamel, Alkyd, Gloss (for Exterior and Interior Surfaces)

TT-E-506K - Enamel, Alkyd, Gloss, Tints and White (for Interior Use)

TT-E-509B(2) - Enamel, Odorless, Alkyd, Interior, Semi-gloss, White and Tints

TT-E-527C - Enamel, Alkyd, Lusterless

TT-E-543A(1) - Enamel, Interior, Undercoat, White and Tints

TT-F-336E - Filler, Wood, Paste

TT-P-19C(2) - Paint, Acrylic Emulsion; Exterior

TT-P-25E(2) - Primer Coating Exterior (undercoat for Wood, Ready-Mixed, White and Tints)

TT-P-29J(1) - Paint, Latex Base, Interior, Flat, White and Tints

TT-P-30E - Paint, Alkyd, Odorless, Interior, Flat, White and Tints

TT-P-37D - Paint, Alkyd Resin; Exterior Trim, Deep Colors

TT-P-52D(2) - Paint, Oil, (Alkyd-Oil) Wood Shakes and Rough Siding

TT-P-55B(2) - Paint, Polyvinyl Emulsion, Exterior

TT-P-81E - Paint, Oil, Alkyd, Ready-Mixed, Medium Shades

TT-P-641G(1) - Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces)

TT-P-645A - Primer Paint, Zinc Chromate, Alkyd Type

TT-P-650C(1) - Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces)

TT-P-664C(2) - Primer Coating, Synthetic, Rust-Inhibiting, Lacquer Resisting

TT-S-176E(1) - Sealer, Surface, Varnish Type, Floor, Wood and Cork

TT-S-300A - Shellac, Cut

TT-S-708A(2) - Stain, Oil, Semi-Transparent, Wood, Exterior

TT-S-711C - Stain, Oil-Type, Wood, Interior

TT-V-86C(1) - Varnish, Oil, Rubbing (for Metal and Wood Furniture)

B. SSPC - Steel Structures Painting Council

SP-6-63 - Commercial Blast Cleaning

SP-10-63T - Near-White Blast Cleaning

C. ASTM - American Society for Testing and Materials

ASTM D 16 - Standard Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products

ASTM D 562 - Consistency of Paints Using the Stromer Viscometer

ASTM D 2833 - Standard Index of Methods for Testing Architectural Paints and Coatings

ASTM D 3276 - Standard Guide for Painting Inspectors (Metal Substrates)

ASTM D 3927 - Standard Guide for State and Institutional Purchasing of Plant

ASTM E 84 - Surface Burning Characteristics of Building Material

1.3 SUBMITTALS

A. Product Data: Submit manufacturers technical information including instructions for thinning, mixing, curing and touch-up.

B. Manufacturer's standard color charts.

C. Test Reports and certificates of compliance.

D. Samples: Prior to beginning work, furnish color chips for surfaces to be painted. Submit samples for the Engineer review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1. On 300 mm x 300 mm hardboard, provide 2 samples of each color and material, with texture to simulate actual conditions. Re-submit samples as requested by Engineer until acceptable sheen, color and texture is achieved.

2. On wood surfaces, provide 2 samples 100 x 200 mm of natural and stained wood finish on actual wood types. Label and identify each as to location and application.

3. On concrete masonry, provide two 100 mm square samples of masonry for each type of finish and color, defining filler, prime and finish coat.

4. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples. Provide full-coat finish samples on at least 9 m^2 of surface, as direct, until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work.

5. Final acceptance of colors will be from samples applied on the job.

1.4 TRANSPORTATION, HANDLING AND STORAGE

A. Deliver materials to job site in manufacturer's original new and unopened packages and containers bearing manufacturer's name and label, and following information:

- Name or title of material.
- Manufacturer's stock number and date of manufacture.
- Manufacturer's name.
- Contents by volume, for major pigment and vehicle constituents.
- Thinning instructions.
- Application instructions.
- Color name and number.

B. Store materials not in actual use in tightly covered containers in a well-ventilated area and protect from moisture, direct sunlight and temperatures below 10^{o}C and above limits recommended by the manufacturer. Maintain containers used in storage of paint in clean conditions, free of foreign materials and residue.

C. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only

within recommended limits.

B. Coordination of Work: Review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

C. Material Quality: Provide manufacturer's best quality trade sale paint material of various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1.6 JOB CONDITIONS

A. Do not paint when air is dust-laden or when weather and temperature conditions are unsuitable. Do not paint exterior surfaces in damp or rainy weather. Comply with manufacturer's recommendations with respect to application and drying period temperatures.

B. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are between 10°C and 32°C, unless otherwise permitted by paint manufacturer's printed instructions.

C. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 7°C and 35°C, unless otherwise permitted by paint manufacturer's printed instructions.

D. Do not apply paint when relative humidity exceeds 85% or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. General: For type of paint, texture and color, refer to Interior Design (I.D.) drawings and specifications.

B. Material Quality: Paints, coatings, and primers shall be ready-mixed at the manufacturer's plant and shall be delivered in sealed containers, labeled and identified. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Paints and finishes shall have Class A rating in accordance with ASTM E 84. Materials without manufacturer's identification as a standard, best-grade product will not be acceptable. Use products of same manufacturer for succeeding coats.

C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

D. Color and Texture:

1. Exterior Painting: Color and texture of the exterior paint shall be as indicated on Drawings.

2. Interior Painting: Colors, textures, and degree of luster will be as indicated on I.D. drawings and specifications. Color selection will include safety colors for hazards in accordance with ANSI Z53.1 Safety Color Code for Marking Physical Hazards. Tint prime and undercoats approximately to the shade of the final coat but with sufficient variation to distinguish them from the preceding coat.

D. Mildewcide: Paints shall contain a mildewcide as recommended by the manufacturer.

E. Solvents and Thinners: As recommended by the paint manufacturer.

2.2 PAINTING SCHEDULE

A. Exterior Paint Schedule:

1. Concrete, Plaster, and Masonry - Smooth:

a.	Prime Coat :	Acrylic Solvent Based Primer.
b.	Second Coat:	Acrylic Copolymer Emulsion, Total Dry Film Thickness (DFT) 25 micron.
c.	Finish Coat:	Same as for Second Coat.

2. Concrete, Plaster, and Masonry - Textured:

a.	Prime Coat :	Acrylic Solvent Based Primer.
b.	Second Coat:	Acrylic Copolymer Emulsion (Sprayed Applied), Dry Film Thickness (DFT) 50 micron.
c.	Finish Coat:	Acrylic Copolymer Emulsion Dry Film Thickness (DFT) 50 micron.

3. Waterproof Painting System:

a. Proprietary coating system consisting of synthetic rubber copolymer and suitable for external exposed application.

b. Prime coats and finish coat shall be applied as per the manufacturer's written recommendations for the intended application.

4. Ferrous Metals:

a.	Prime Coat :	Polyamide Cured Epoxy Primer, 50 micron (DFT).
b.	Second Coat:	High Build Epoxy, 125 micron thick (DFT).
c.	Finish Coat:	Two-Component Polyurethane, semi-gloss, 50 micron (DFT).

5. Zinc-Coated Metals:

a.	Prime Coat :	Acrylic Water Based Primer for GI.
b.	Second Coat:	Alkyd Enamel, semi-gloss, 30 micron (DFT).
c.	Finish Coat:	Same as for second coat.

6. Painted Wood:

a.	Prime Coat:	Alkyd Wood Primer + Wood Filler.
b.	Second Coat:	Alkyd Enamel, semi-gloss, 30 micron (DFT).
c.	Finish Coat:	Same as for second coat.

7. Natural Finish Wood:

a.	Prime Coat:	Alkyd Wood Stain.
b.	Second Coat:	Lacquer, semi-gloss, 25 micron (DFT).
c.	Third Coat:	Same as for second coat.
d.	Finish Coat:	Same as for second coat.

B. Interior Paint Schedule:

1. Concrete, Plaster, Gypsum Board, Reinforced Decorative Gypsum and Masonry:

a. Prime Coat: Acrylic Solvent Based Primer, flat.
b. Second Coat: Acrylic Emulsion, eggshell, Dry Film Thickness 25 micron (DFT).
c. Finish Coat: Same as for second coat.

2. Ferrous Metals:

a. Prime Coat: Alkyd Primer.
b. Second Coat: Alkyd Enamel, semi-gloss, 30 micron (DFT).
c. Finish Coat: Same as for second coat.

3. Zinc-Coated Metals:

a. Same as specified for Exterior Paint Schedule.

4. Painted and Natural Finish Wood:

a. Prime Coat: Alkyd Wood Stain.
b. Second Coat: Lacquer, semi-gloss, 25 micron (DFT).
c. Third Coat: Same as for second coat.
d. Finish Coat: Same as for second coat.

5. Exposed Pipes, Ducts, and Metal work:

a. Prime Coat: Alkyd Primer.
b. Second Coat: Alkyd Enamel, semi-gloss, 30 micron (DFT).
c. Finish Coat: Same as for second coat.

6. Intumescent Coating for Steel Structures: Refer to Section 07270 - FIRESTOPPING.

3. PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrate and conditions under which painting will be performed. Proceed with the work only when conditions are satisfactory.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

A. General:

1. Remove hardware and accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

3. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

4. Fill dents, cracks, hollow places, open joints, and other irregularities with a filler suitable for the purpose and, after setting sand to a smooth finish.

5. Prime surfaces not more than 8 hours after cleaning. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

B. Concrete, Masonry and Plaster Works: Prepare surfaces of concrete, concrete masonry cement plaster and gypsum plaster to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze. Use abrasive blast-cleaning methods if recommended by paint manufacturer and approved by Engineer.

1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

2. Clean concrete floor surfaces scheduled to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralize acid, and allow to dry before painting.

C. Gypsum Board: Repair minor cracks and holes with finishing compound, and sand smooth after drying.

D. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended know sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

E. Ferrous Metals: Clean non-galvanized ferrous-metal surfaces that have not been shop coated; remove mortar, plaster, grease, dirt, rust, loose mill scale and other foreign substances by solvent or mechanical cleaning methods that comply with the recommendations of the Steel Structures Painting Council, before priming coat is applied.

F. Shop-Primed Ferrous Surfaces: Remove grease, oil and other foreign substances with approved type of cleaner manufactured for the purpose. Exercise care to prevent damage to shop coat. Touch-up abraded or marred shop coats with paint used for priming.

G. Zinc-Coated (Galvanized) Surfaces: Remove grease and oil with a cleaner manufactured for the purpose. Treat surfaces with a chemical compound such as a phosphoric acid wash. Remove the chemical compound completely with clean, fresh water.

3.3 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in clean condition, free of foreign materials and residue.

C. Stir materials before application to produce mixture of uniform density, stir as required during

application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

A. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied. Do not exceed manufacturers recommended coverage per gallon. Apply materials with care to a uniform and proper film thickness, showing no runs, holidays, sags, crawls, or other defects. Apply with a minimum of brush marks. Finish surfaces shall be uniform in sheen, color and texture and match approved samples.

B. Allow coats to dry thoroughly before succeeding coats are applied; allow a minimum of 24 hours between applications on any one surface unless otherwise specified by the paint materials manufacturer.

C. Sandpaper undercoats on interior metal thoroughly and uniformly to provide a smooth, even surface for finish coats.

D. Apply paint by brush, roller, spray, or other acceptable practice in accordance with the manufacturer's directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high-pile sheep wool as recommended by the paint manufacturer for material and texture required.

E. Brush-out and work all brush coats into the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Neatly draw all primer or first coats, unless otherwise permitted to use mechanical applicators.

F. Except as otherwise specified, apply a prime coat to material that is required to be painted or finished.

G. Apply the first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

H. Number of coats and paint film thickness required is the same regardless of the application method. Sand between each enamel and varnish coat application with fine sandpaper or rub surfaces with pumice stone where required to produce an even, smooth surface in accordance with the paint manufacturer's directions.

I. Allow sufficient time between successive coatings to permit thorough drying. Do not re-coat until paint does not deform or feel sticky under moderate thumb pressure and the application of loss of adhesion of the undercoat.

J. Paint type, color, surface treatment shall be as scheduled. Provide finish coats that are compatible with prime paints used.

K. When undercoats, stains, or other conditions show through the final coat of paint, apply additional coats until the paint film is of uniform finish, color and appearance. Insure that all surfaces including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.

L. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only. Exposed surfaces are defined as those areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles and similar items are in place in areas scheduled to be painted.

M. Where visible through registers or grilles, paint interior surfaces of ducts and void spaces with a

flat, non-specular black paint.

N. Paint the back sides of access panels and removable or hinged covers to match the exposed surfaces.

O. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

P. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

Q. Dry Film Thickness: Provide dry film thickness for each finish type, including prime and finish coats, not less than total dry film thickness as specified in painting schedule.

R. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surfaces imperfections.

S. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.

T. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.

U. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or re-paint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION

A. Clean-Up:

1. During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

2. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch otherwise damage finished surfaces.

B. Protection:

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and re-painting, as acceptable by the Engineer.

2. Provide **Wet Paint** signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

3. At completion of work of other trades, touch-up and restore damaged and/or defaced surfaces.

END OF SECTION

SECTION
WALL COVERINGS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and prime painting.

B. Vinyl and fabric wall coverings.

1.2 REFERENCES

A. ANSI/ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

B. FS CCC-W-408 - Wall Covering, Vinyl Coated.

C. FS L-P-1040 - Plastic Sheets and Strips, Poly Vinyl Chloride.

D. NFPA 255 - Test of Surface Burning Characteristics of Building Materials.

E. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing commercial wall fabrics with 5 years documented experience.

B. Applicator: Company specializing in installing wall fabrics with 5 years documented] experience and shall be as approved by wall covering manufacturer and the Engineer.

1.4 SUBMITTALS

A. Indicate on shop drawings, wall elevations with seaming layout.

B. Provide product data on wall covering, adhesive and manufacturer standard systems related to acoustic treatment or fabric installation.

C. Submit two samples of wall covering 600 x 600 mm in size illustrating color, finish, and texture.

D. Submit manufacturer's installation instructions and recommendations.

E. Submit manufacturer's certificate showing that products meet or exceed the specified requirements.

F. Submit test reports verifying flame/smoke ratings, when tested by UL or an agency approved by the Engineer.

1.5 FIELD MOCKUP

A. Provide a three-panel field sample panel, full height, illustrating installed wall covering, joint seaming technique and panel system where applicable for each different type of installation.

B. Locate where directed by the Engineer.

C. Accepted sample may not remain as part of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials on site to verify acceptance.

B. Protect packaged adhesive from temperature cycling.

C. Storage and handling of wall coverings as well as the related materials shall be in accordance with the manufacturer recommendation. Do not store roll goods on end.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures at 18 degrees C, unless required otherwise by the manufacturer instructions.

B. Do not apply adhesive when substrate surface temperature, ambient temperature or humidity are not within the acceptable conditions recommended by the manufacturer.

C. Maintain those conditions 24 hours before, during, and after installation of adhesive wall covering.

D. Provide a minimum lighting level of 860 lx measured mid-height at substrate surfaces.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Vinyl Wall Covering:

1. General: For selection of vinyl wall covering refer to I.D. drawings and specifications.

2. Type: FS CCC-W-408A, Type III heavy duty wall covering.

3. Stain Resistance: Factory applied polyvinyl fluoride or polymer coating.

4. Backing Materials: As recommended by wall covering manufacturer.

B. Fabric Wall Covering

1. General: For selection of fabric wall covering refer to I.D. drawings and specifications.

2. Complies with ASTM F 793 for Category III.

3. Colors, Textures and Patterns: Refer to I.D. drawings and specifications.

4. Backing Materials: Acrylic.

C. Accessories

1. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.

2. Primer/Sealer: Mildew-resistant and recommended by wall covering manufacturer.

3. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall covering manufacturer.

4. Seam Tape: As recommended by wall covering manufacturer.

D. Substrate Filler: As recommended by adhesive and wall covering manufacturers, compatible with substrate.

3. PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering and/or fabric manufacturer.

B. Verify flatness tolerance of surfaces does not vary more 3 mm in 3 m nor vary at a rate greater than 1.5 mm per 300 mm.

C. Beginning of installation means acceptance of existing surfaces and/or substrate.

3.2 PREPARATION

A. Fill cracks and smooth irregularities with filler; sand smooth.

B. Wash surfaces with a cleaning material recommended by manufacturer, rinse and neutralize; wipe dry.

C. Sand glossy surfaces. Shellac marks which may bleed.

D. Remove electrical, telephone, and wall plates and covers.

E. Vacuum clean surfaces free of loose particles.

F. Apply 2 coats of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth. Vacuum clean.

3.3 INSTALLATION OF WALL COVERINGS AND/0R WALL FABRIC PANELS

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply adhesive to wall surface immediately prior to application of wall covering.

C. Use wall covering in roll number sequence or in pattern sequence as required.

D. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.

E. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tight.

F. Horizontal seams are not acceptable.

G. Do not seam within 50 mm of internal corners or within 150 mm of external corners.

H. Install wall covering before installation of bases, cabinets, hardware, or items attached to or spaced slightly from wall surface. Do not install wall covering more than 6 mm below top of resilient base.

I. Cover spaces above and below windows, above doors, in pattern or sequence from roll.

J. Apply fabric covering to electrical, telephone and wall plates prior to replacing.

K. Where wall covering tucks into door frame reveals, or metal wallboard or plaster stops, apply covering with contact adhesive within 150 mm of wall covering termination. Ensure full contact bond.

L. Install termination trim as required.

M. Remove excess wet adhesive from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.4 CLEANING AND PROTECTION

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Replace wall plates and accessories removed prior to work of this Section.

C. Protect finished installation as directed by the Engineer.

END OF SECTION

CONSTRUCION OF ADMIN BLOCK

IBA PUBLIC SCHOOL SUKKUR

ARCHITECTURE

DRWING

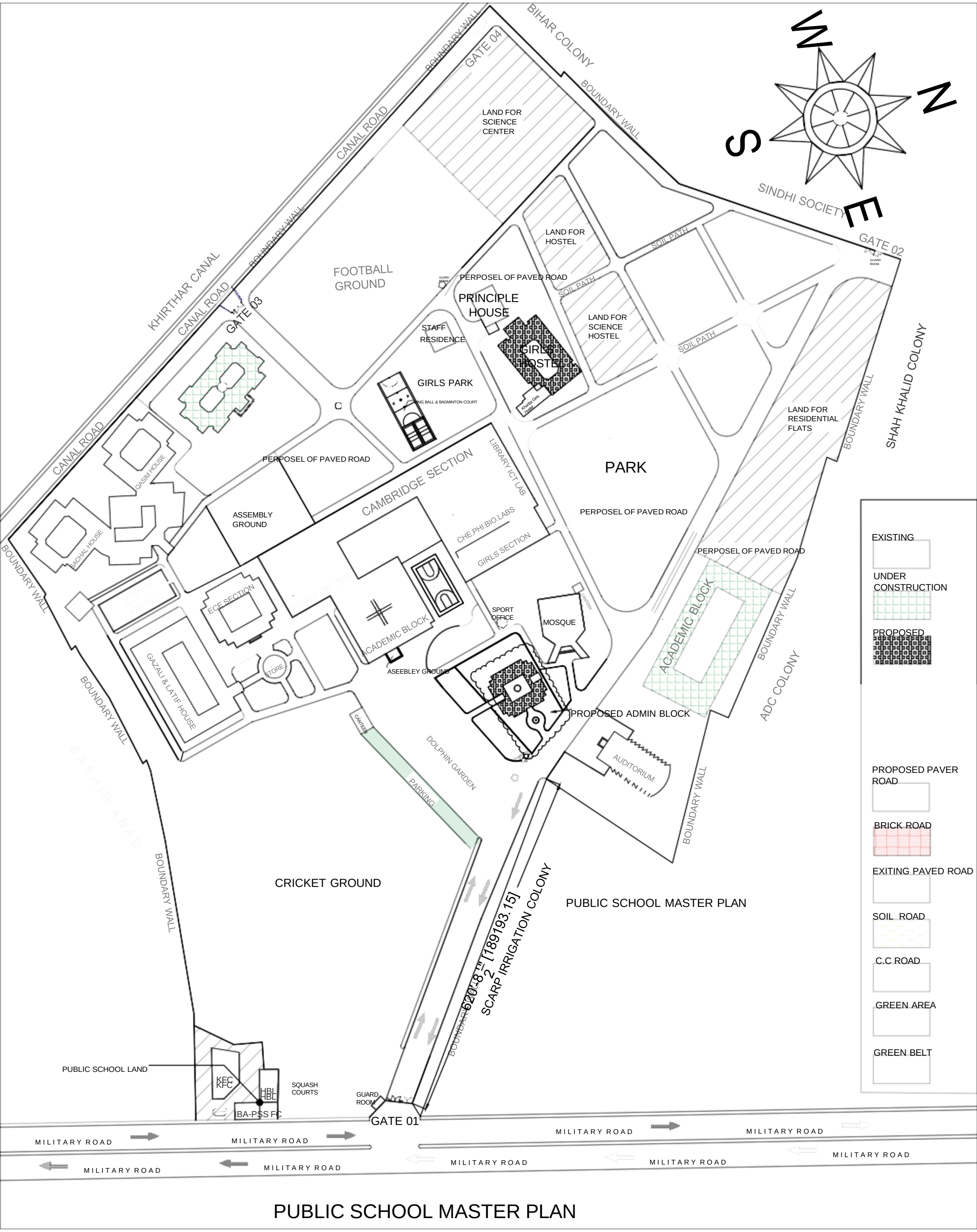
CLIENT

SUKKUR IBA UNIVERSITY

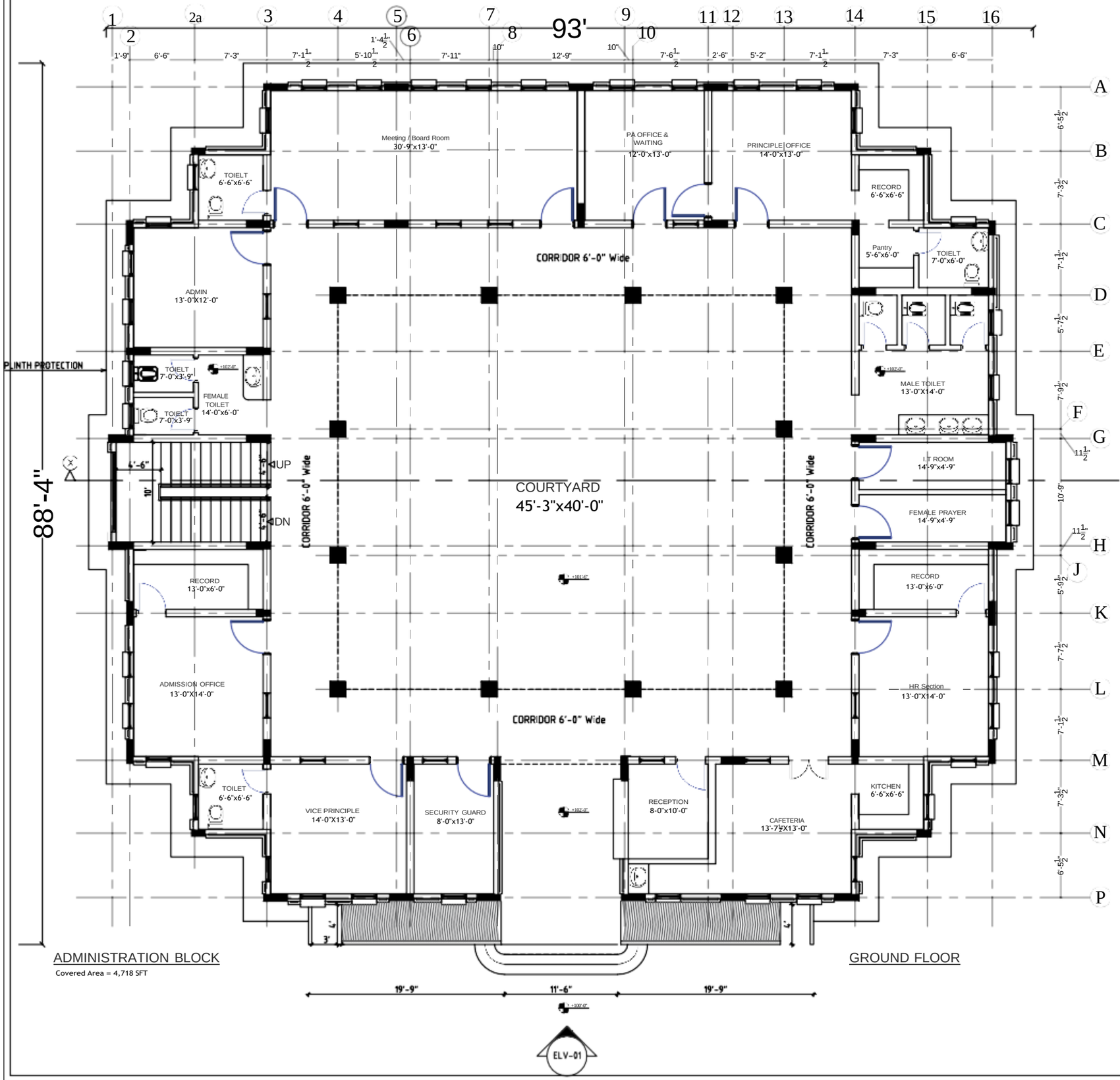
CONSULTANT

NBK CONSULTANTS

CONSULTING ENGINEERS, ARCHITECTS & PLANNERS



PUBLIC SCHOOL MASTER PLAN



ADMINISTRATION BLOCK

Covered Area = 4,718 SFT

GROUND FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

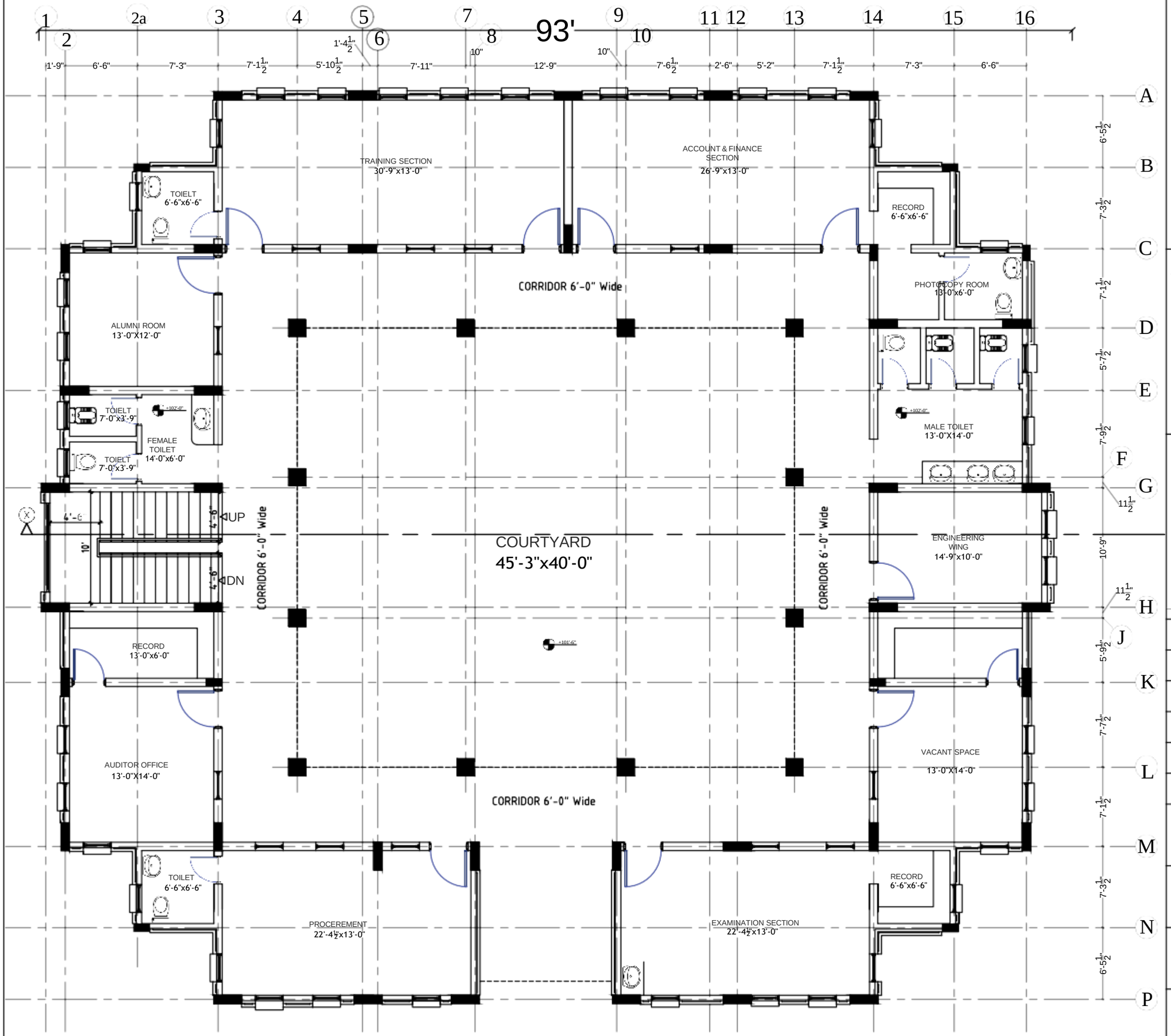
DISCIPLINE: ARCHITECTURE

TITLE: GROUND FLOOR PLAN

SCALE: N.T.S

DATE: 10-08-2025

DWG-NO: AR-01



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

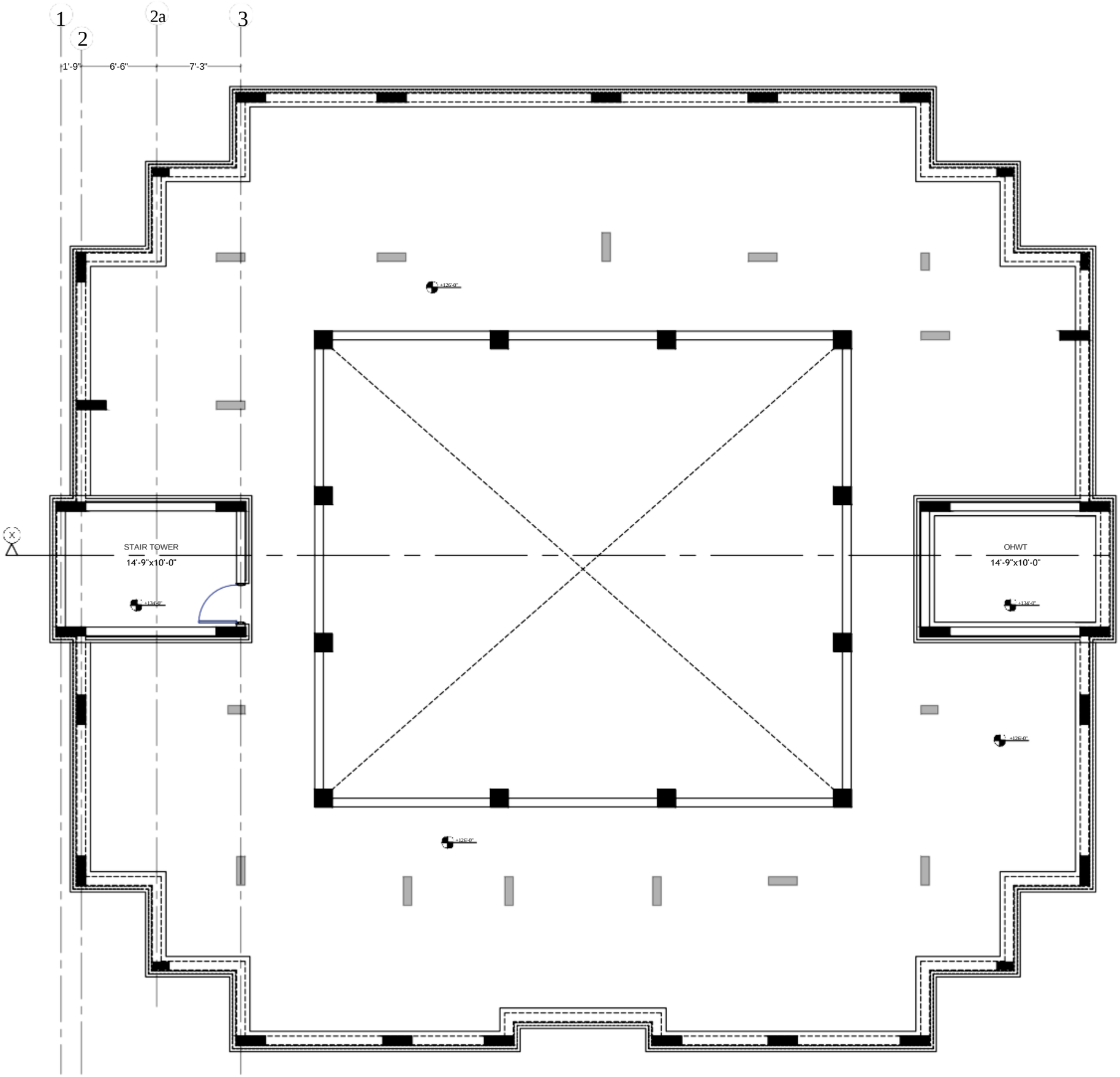
DISCIPLINE: ARCHITECTURE

TITLE: FIRST FLOOR PLAN

SCALE: N.T.S

DATE: 10-08-2025

DWG-NO AR-02



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

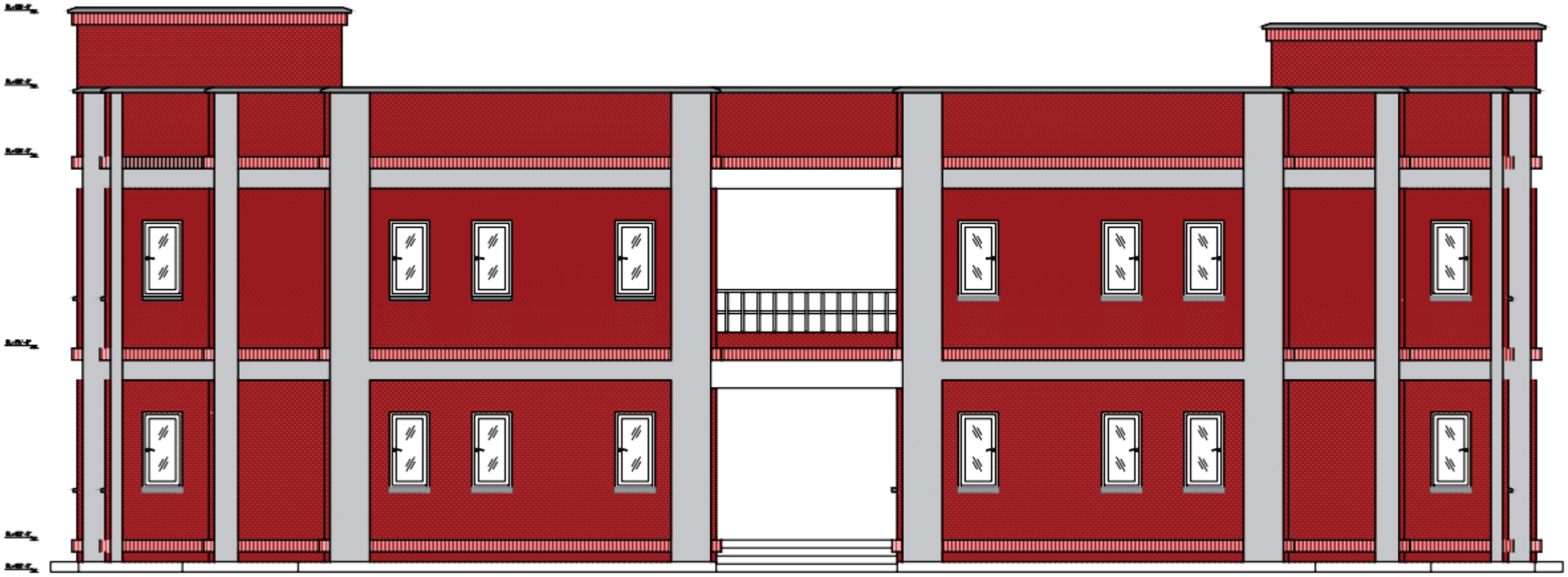
REV:	
ISSUE:	

DISCIPLINE: ARCHITECTURE

TITLE: ROOF FLOOR PLAN

SCALE: N.T.S

DATE:	DWG-NO
10-08-2025	AR-03



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

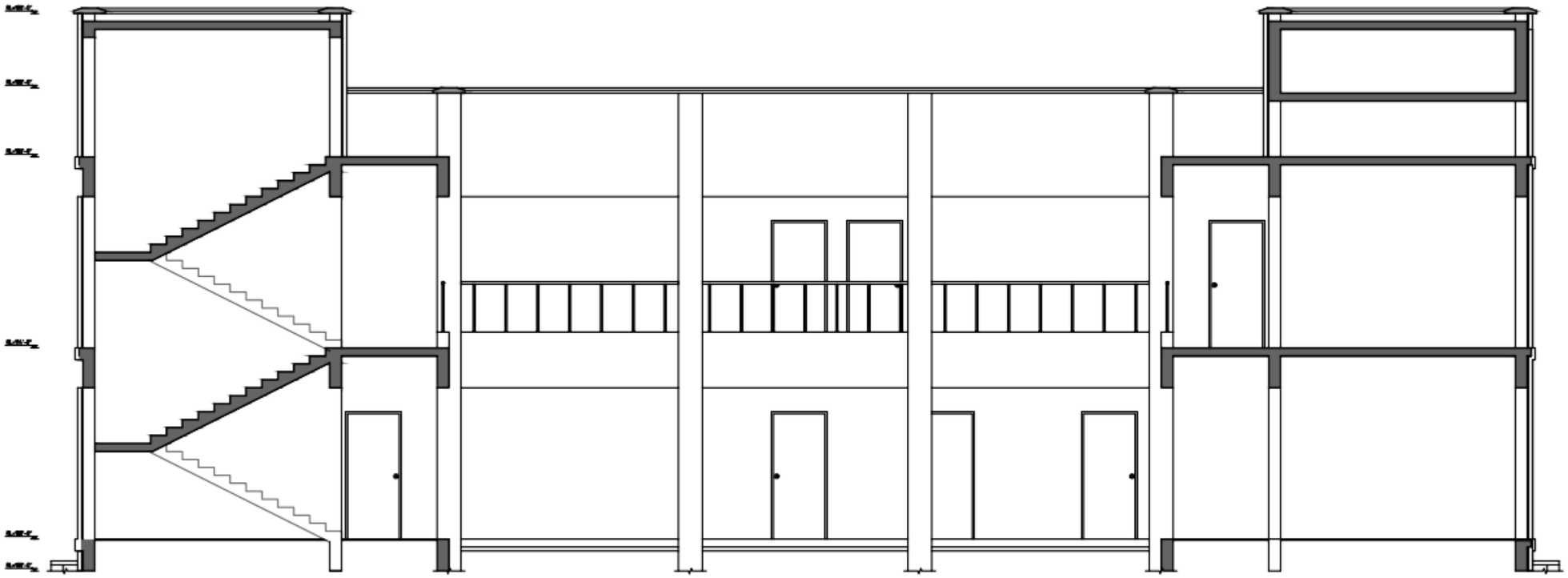
REV:	
ISSUE:	

DISCIPLINE: ARCHITECTURE

TITLE: FRONT ELEVATION

SCALE: N.T.S

DATE:	DWG-NO
10-08-2025	AR-04



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

DISCIPLINE: ARCHITECTURE

TITLE: SECTION X-X

SCALE: N.T.S

DATE:	DWG-NO
10-08-2025	AR-05

CONSTRUCION OF ADMIN BLOCK

IBA PUBLIC SCHOOL SUKKUR

STRUCTURE

DRWING

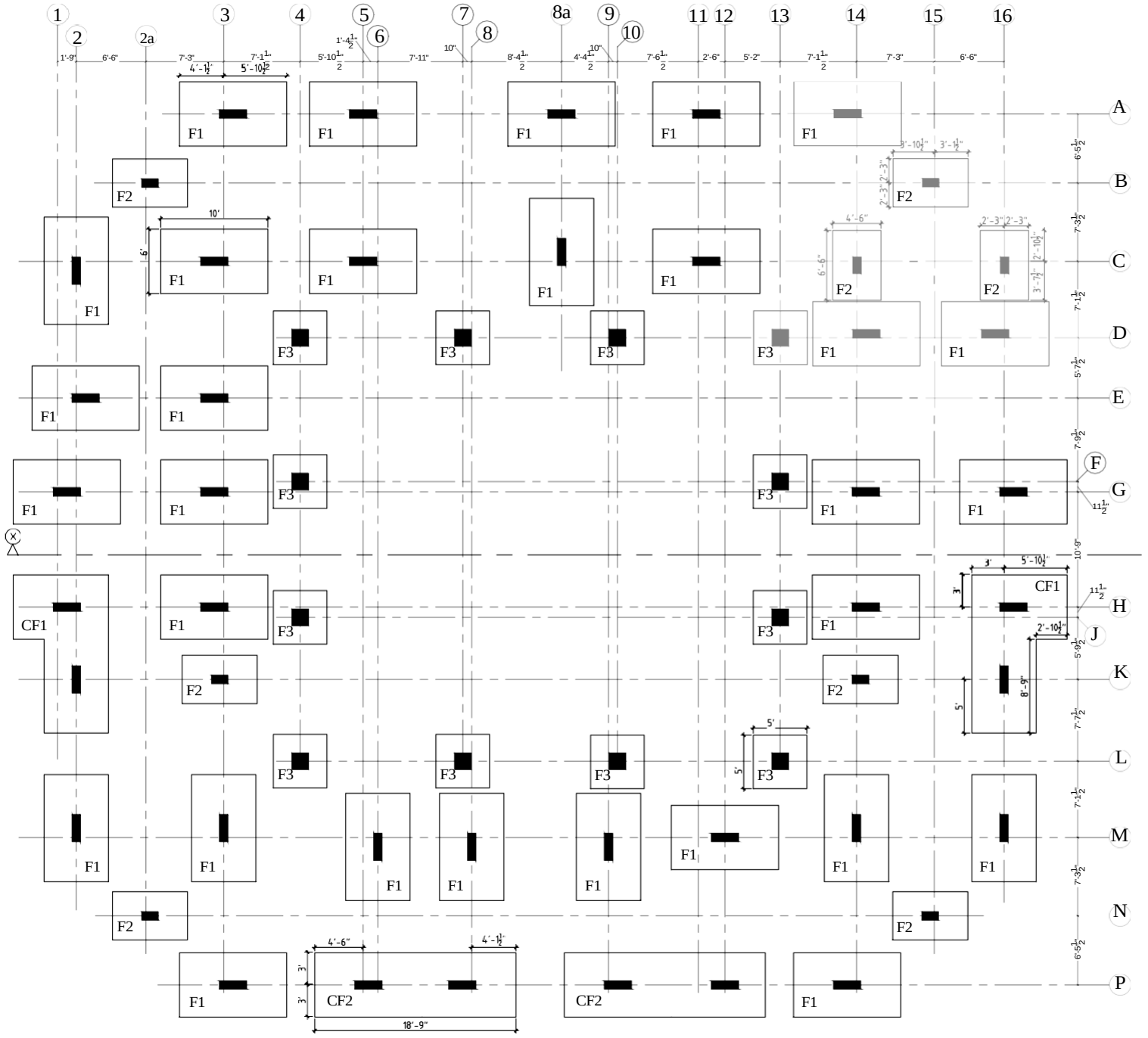
CLIENT

SUKKUR IBA UNIVERSITY

CONSULTANT

NBK CONSULTANTS

CONSULTING ENGINEERS, ARCHITECTS & PLANNERS



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

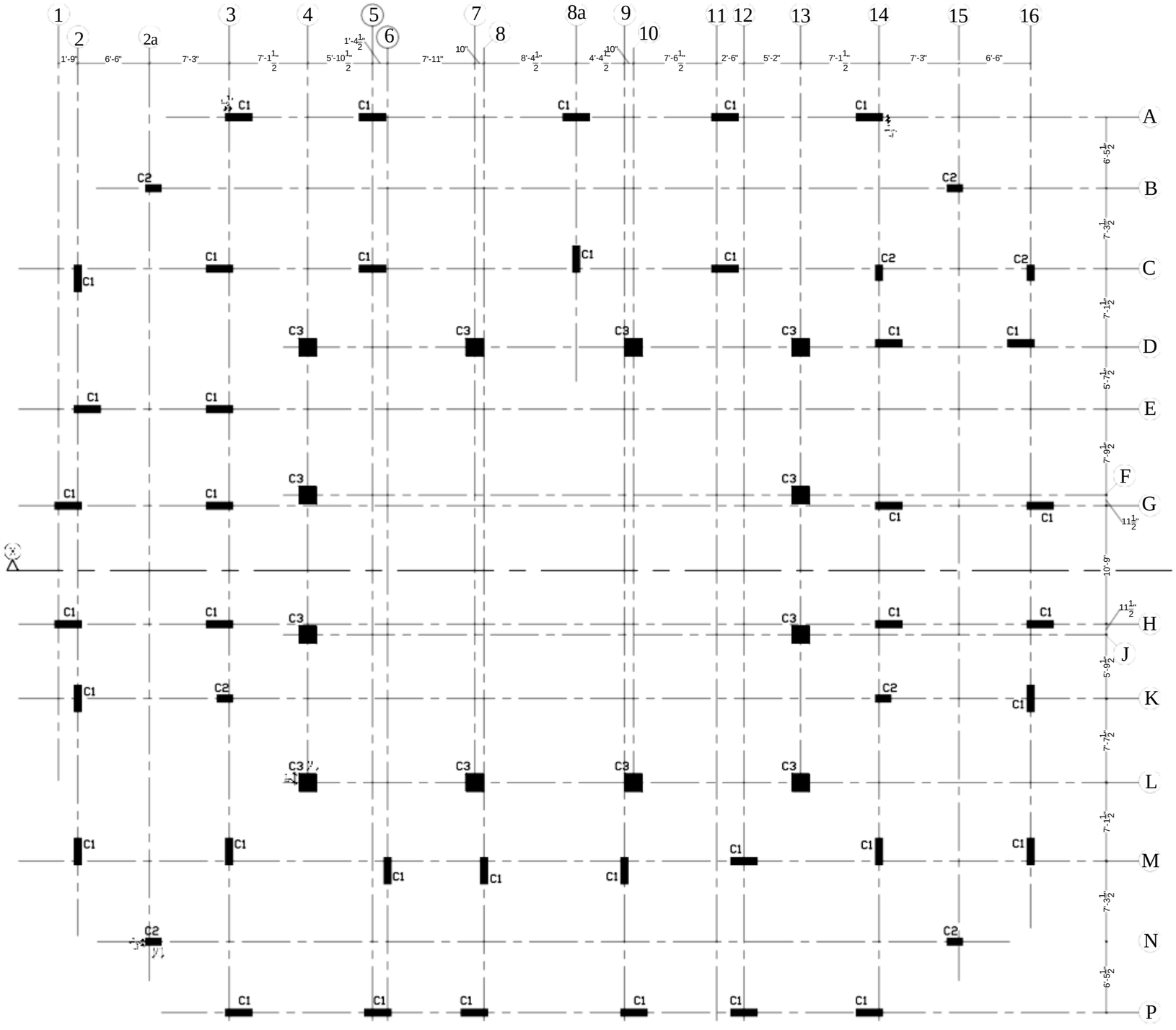
REV:	
ISSUE:	

DISCIPLINE: STRUCTURE

TITLE: FOOTING PLAN

SCALE: N.T.S

DATE:	DWG-NO
08-08-2025	ST-01



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

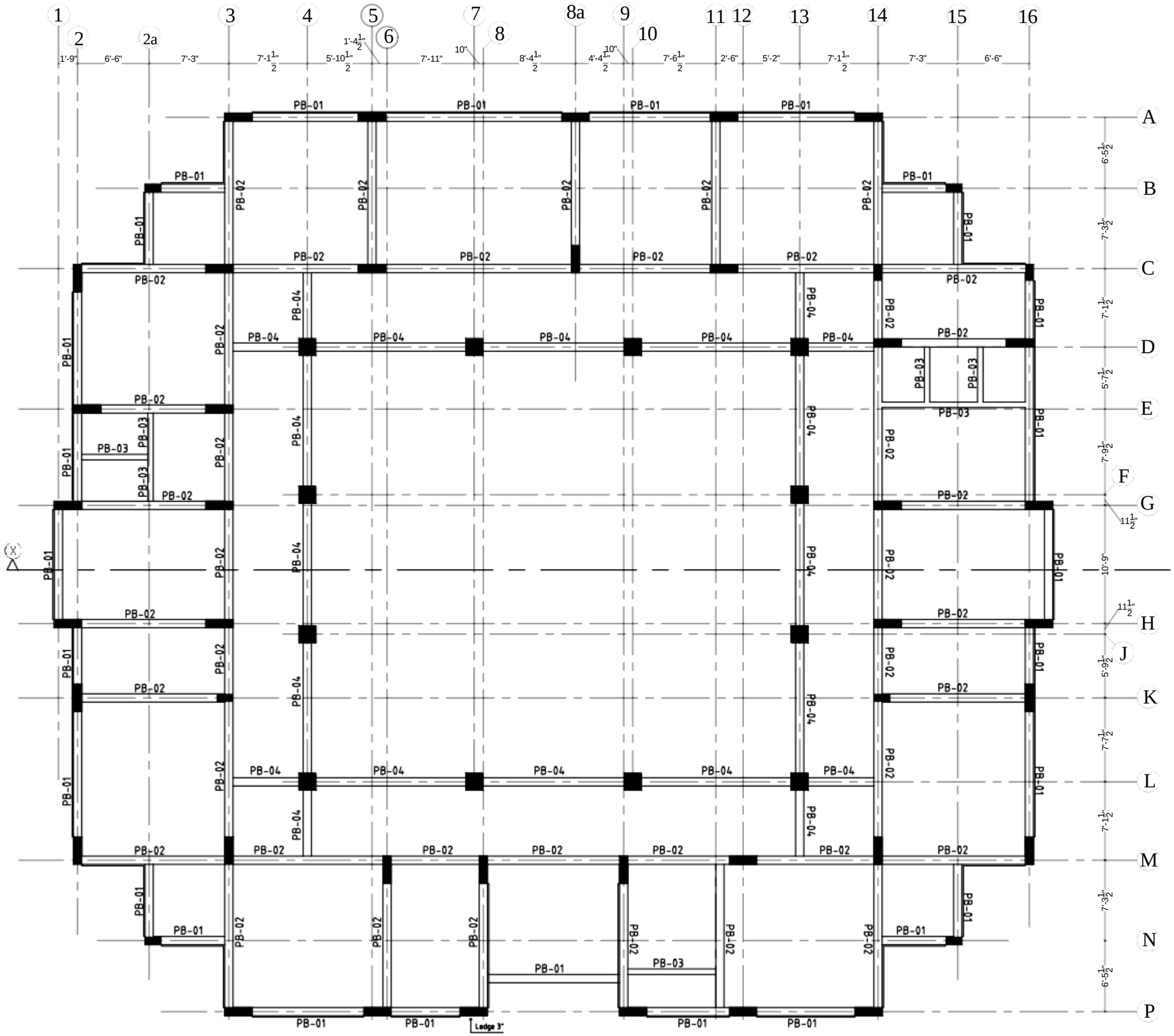
REV:	
ISSUE:	

DISCIPLINE: STRUCTURE

TITLE: COLUMN PLAN

SCALE: N.T.S

DATE:	DWG-NO
08-08-2025	ST-02



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

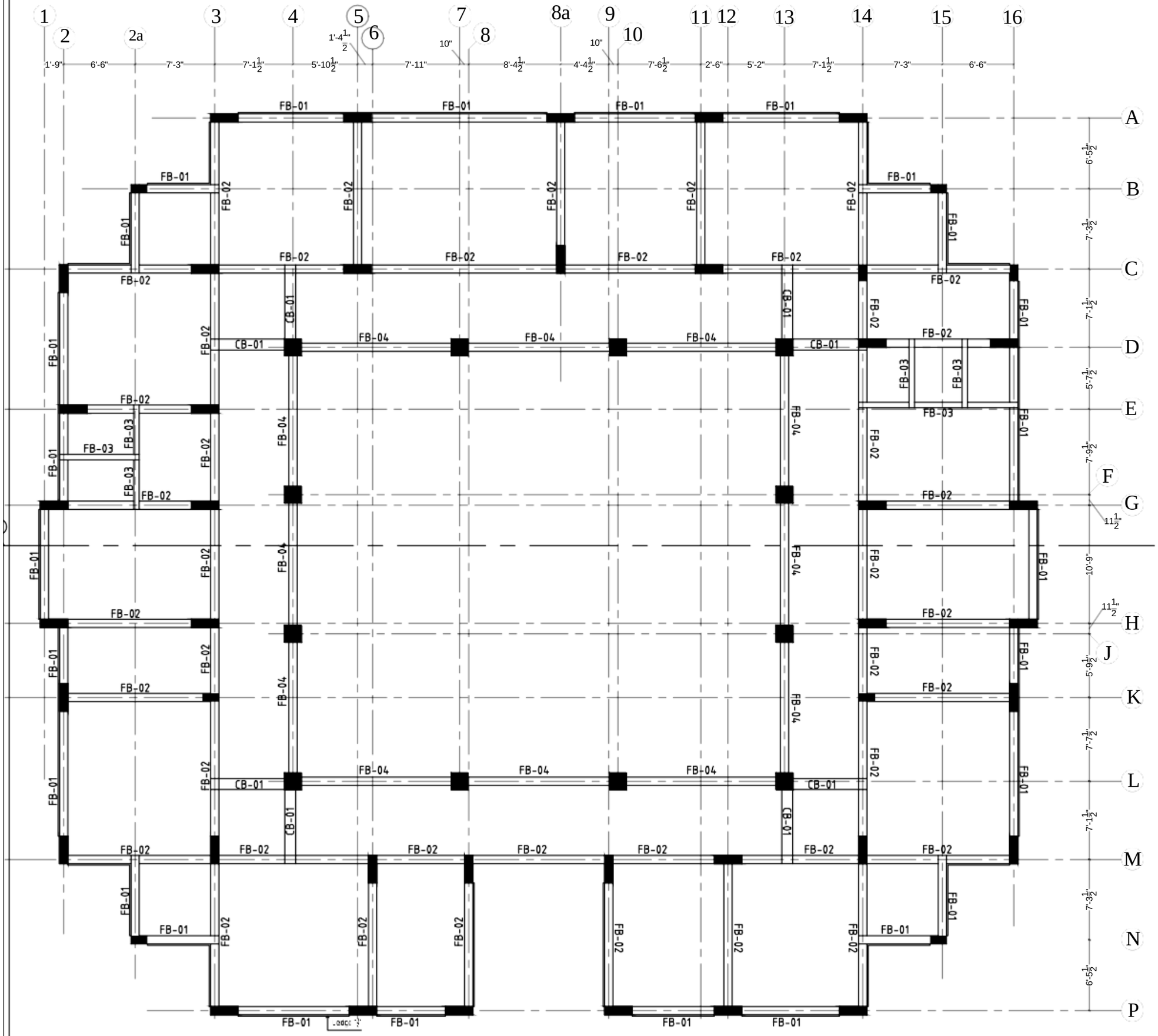
DISCIPLINE: STRUCTURE

TITLE: PLINTH BEAM PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: ST-03



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

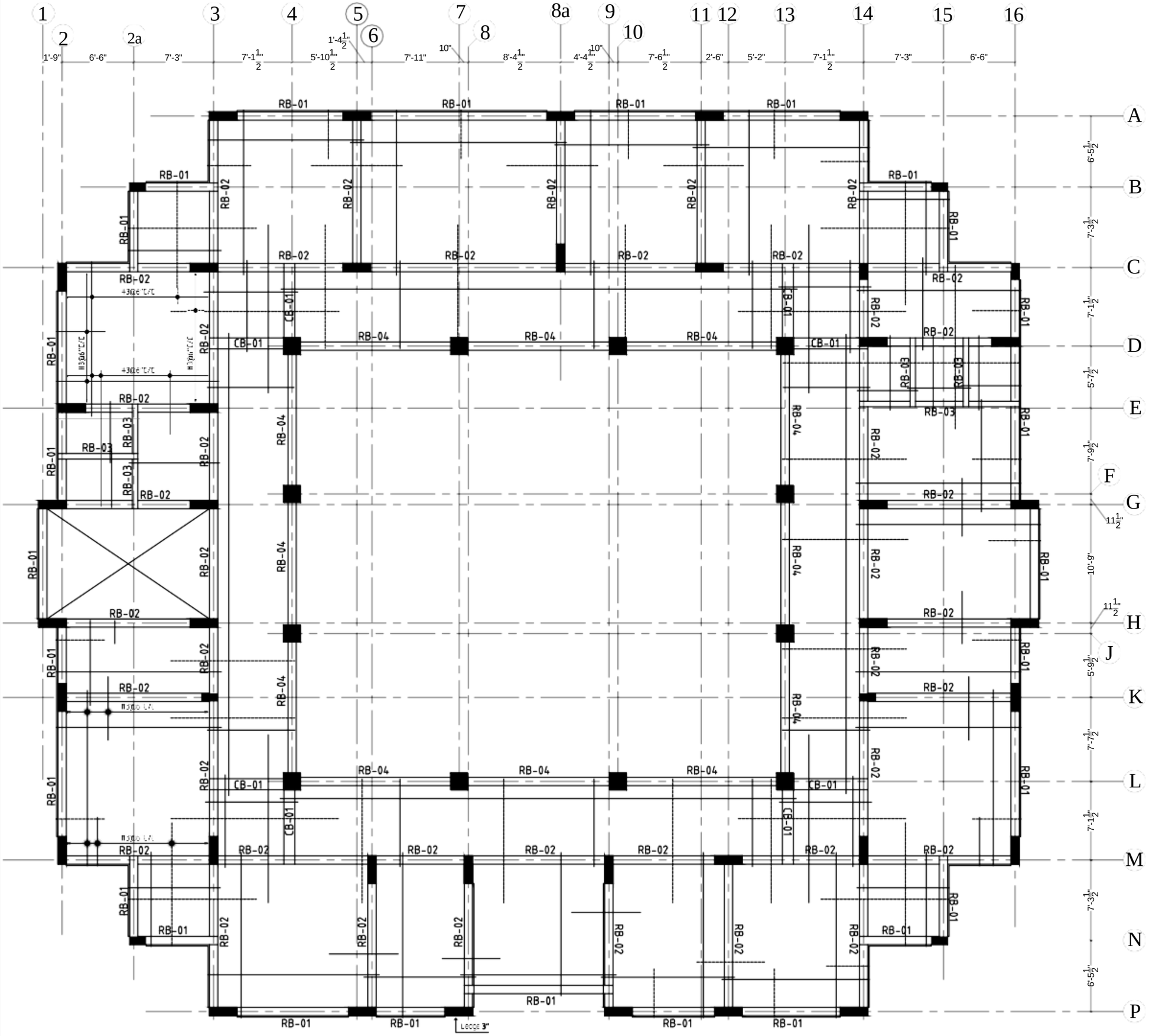
DISCIPLINE: STRUCTURE

TITLE: FLOOR BEAM PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: ST-04



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

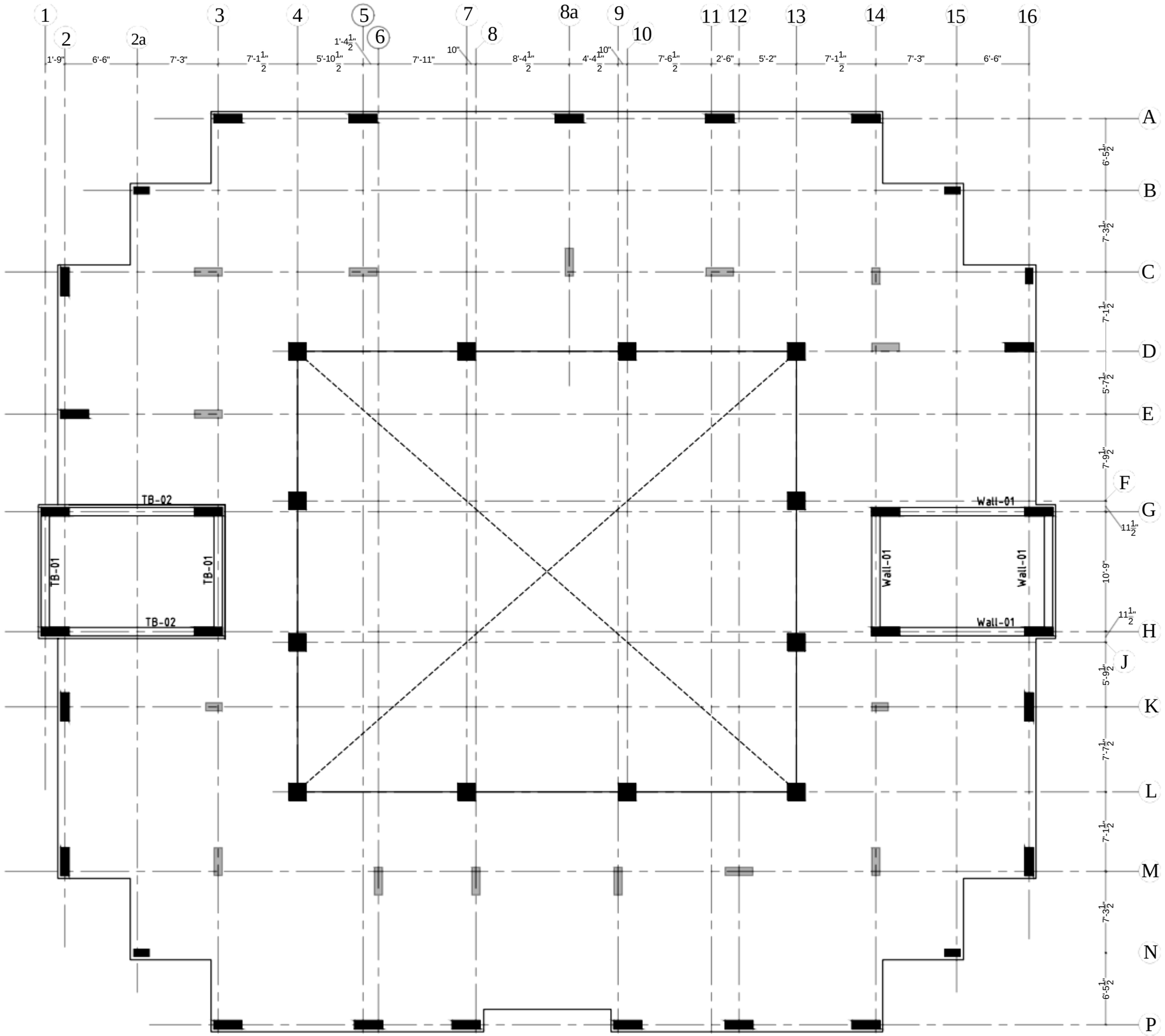
DISCIPLINE: STRUCTURE

TITLE: ROOF BEAM PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: ST-05



ADMINISTRATION BLOCK

ROOF PLAN

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS
Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

DISCIPLINE: STRUCTURE

TITLE: STAIR TOWER & CHWT PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: ST-06

SCHEDULE OF FOOTING

S-NO	FOOTING	NOs	SIZE (LXBXD)	BOTTOM STEEL		TOP STEEL	
				X-AXIX	Y-AXIX	X-AXIX	Y-AXIX
1	F1	34	10'-0" X 6'-0" X 1'-6"	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C
2	F2	12	4'-6" X 6'-6" X 1'-6"	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C
3	F3	12	5'-0" X 5'-0" X 1'-6"	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C
4	CF1	2	VARIES X 2'-0"	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C
5	CF2	2	VARIES X 2'-0"	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C	$\frac{1}{2}$"Ø@6"C/C

SCHEDULE OF COLUMN

S-NO	COLUMN	NOs	SIZE (LXB)	MAIN BARS	STIRRUPS
1	C1	34	2'-0" X 0'-9"	12 # $\frac{5}{8}$"Ø	$\frac{3}{8}$"Ø@6"C/C
2	C2	12	1'-6" X 0'-9"	12 # $\frac{5}{8}$"Ø	$\frac{3}{8}$"Ø@6"C/C
3	C3	12	1'-6"X 1'-6"	12 # $\frac{5}{8}$"Ø	$\frac{3}{8}$"Ø@6"C/C

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

DISCIPLINE: STRUCTURE

TITLE: REINFORCEMENT SCHEDULE

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: ST-07

CONSTRUCION OF ADMIN BLOCK

IBA PUBLIC SCHOOL SUKKUR

PUBLIC HEALTH ENGINEERING

DRWING

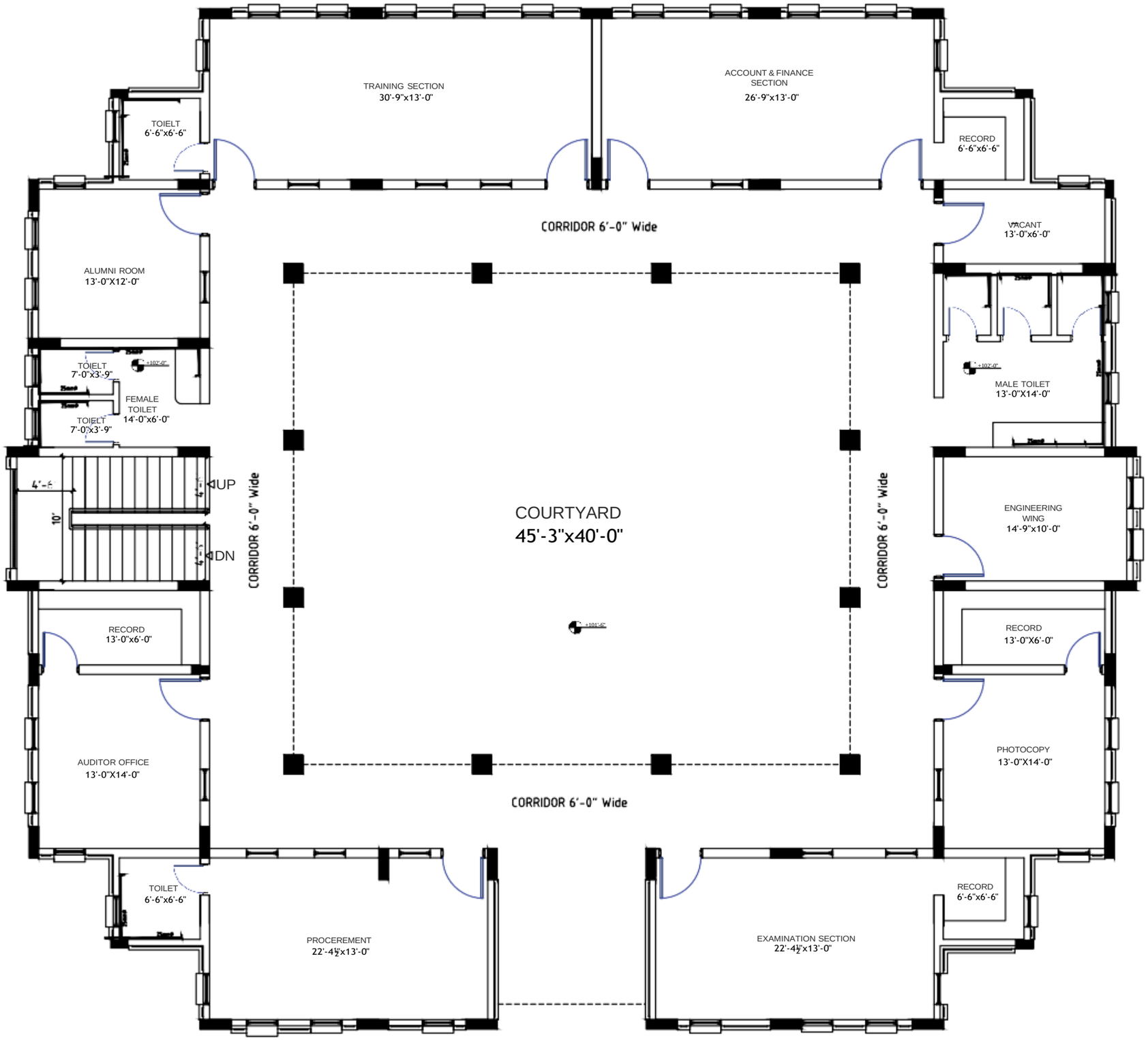
CLIENT

SUKKUR IBA UNIVERSITY

CONSULTANT

NBK CONSULTANTS

CONSULTING ENGINEERS, ARCHITECTS & PLANNERS



ADMINISTRATION BLOCK

Covered Area = 4,718 SFT

FIRST FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

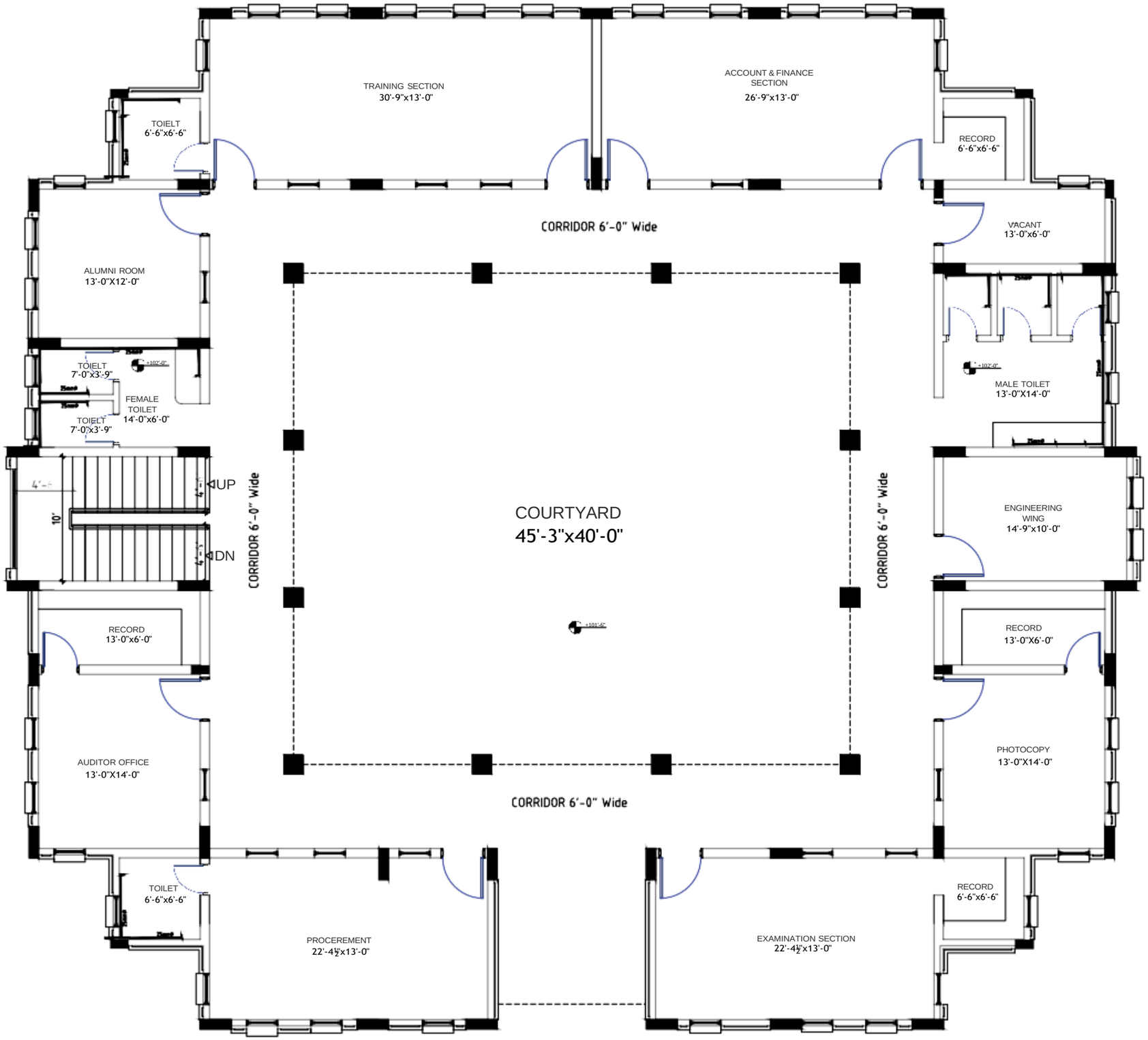
DISCIPLINE: PLUMBING

TITLE: COLD WATER LINE LAYOUT PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: PL-04



ADMINISTRATION BLOCK

Covered Area = 4,718 SFT

FIRST FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

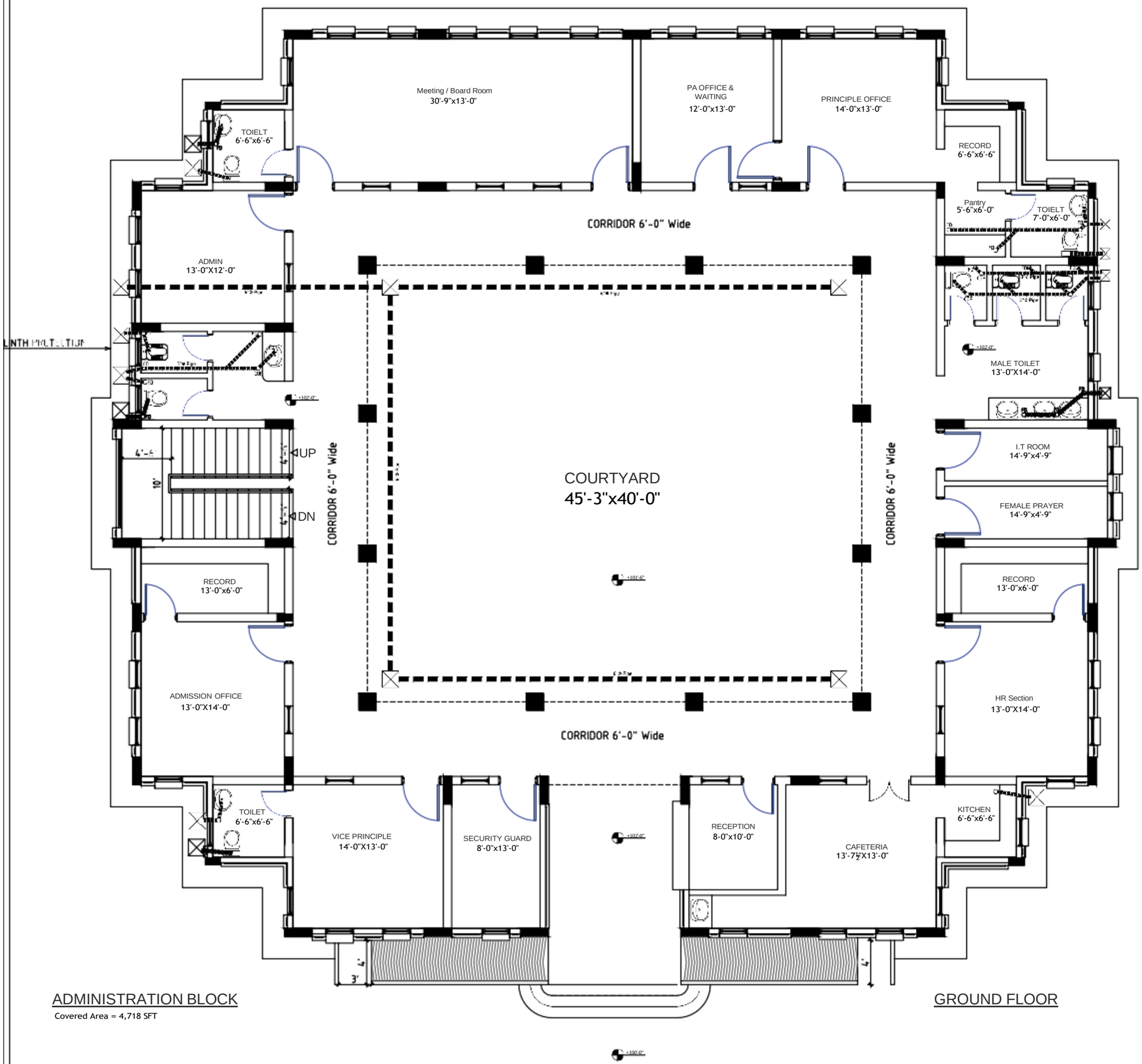
REV:	
ISSUE:	

DISCIPLINE: PLUMBING

TITLE: COLD WATER LINE LAYOUT PLAN

SCALE: N.T.S

DATE:	DWG-NO
08-08-2025	PL-05



ADMINISTRATION BLOCK

Covered Area = 4,718 SFT

GROUND FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

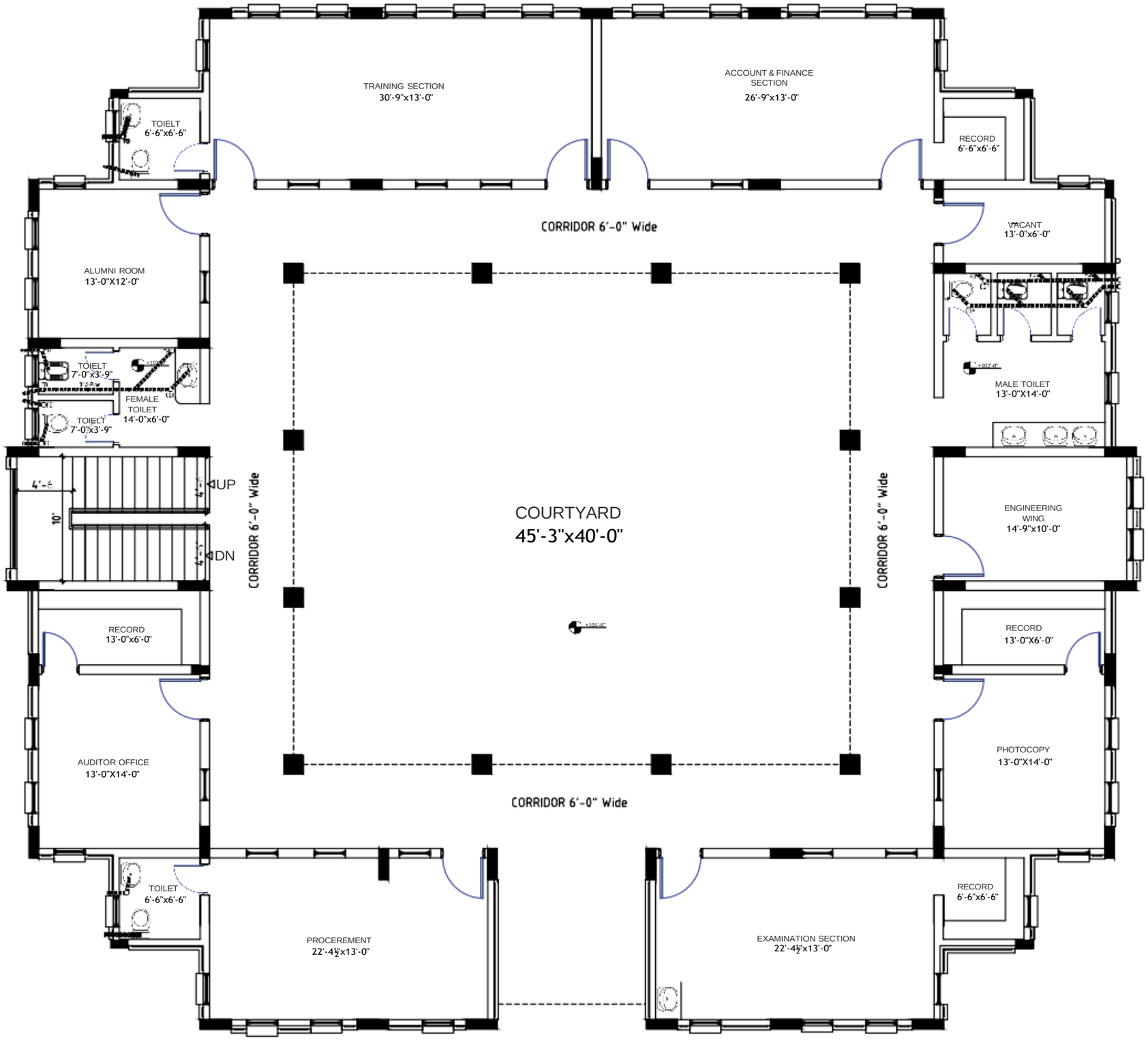
DISCIPLINE: PLUMBING

TITLE: WASTE WATER LINE LAYOUT PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: PL-01



ADMINISTRATION BLOCK

Covered Area = 4,718 SFT

FIRST FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

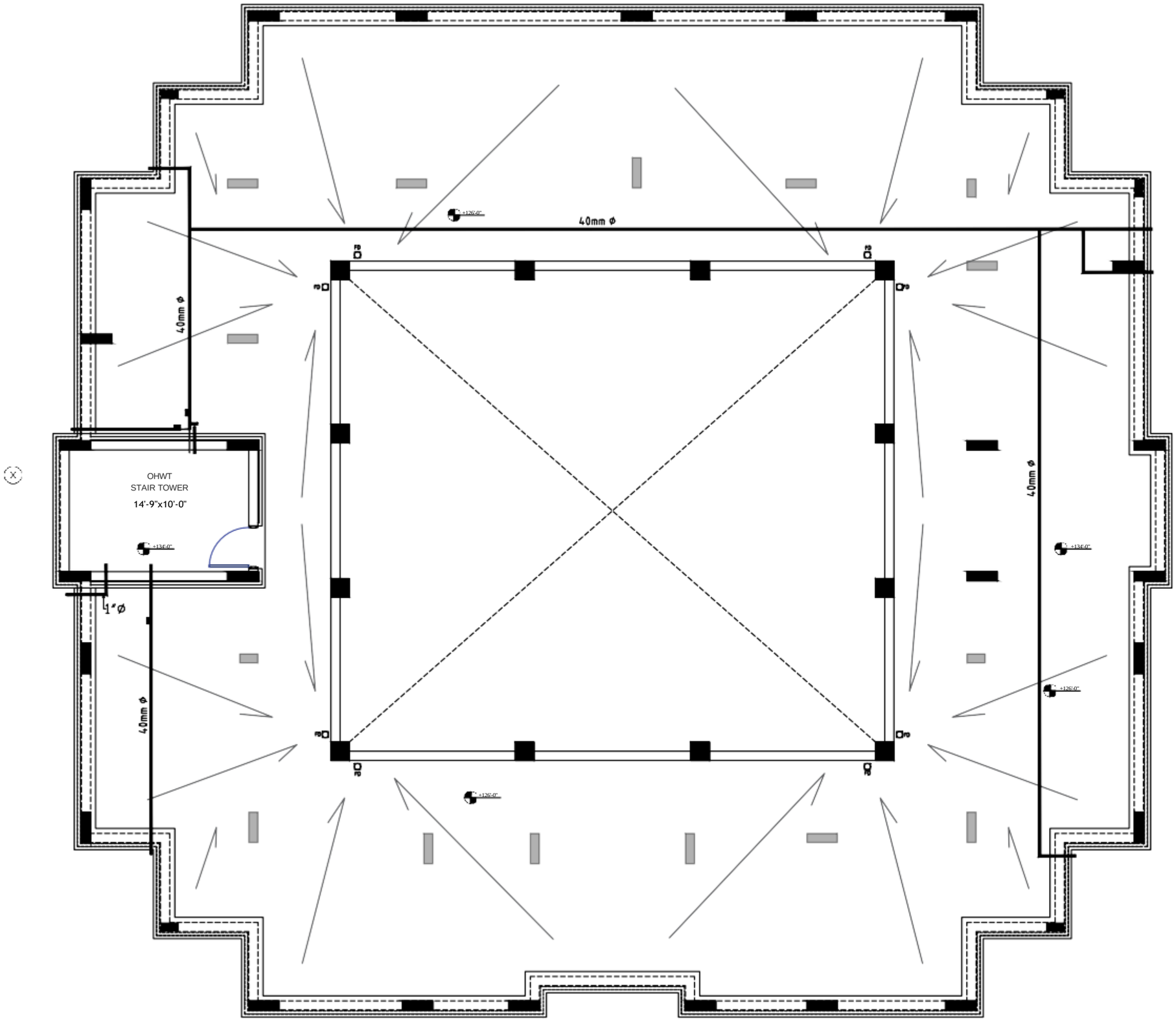
DISCIPLINE: PLUMBING

TITLE: WASTE WATER LINE LAYOUT PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: PL-02



ADMINISTRATION BLOCK

Covered Area = 141 SFT

ROOF FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

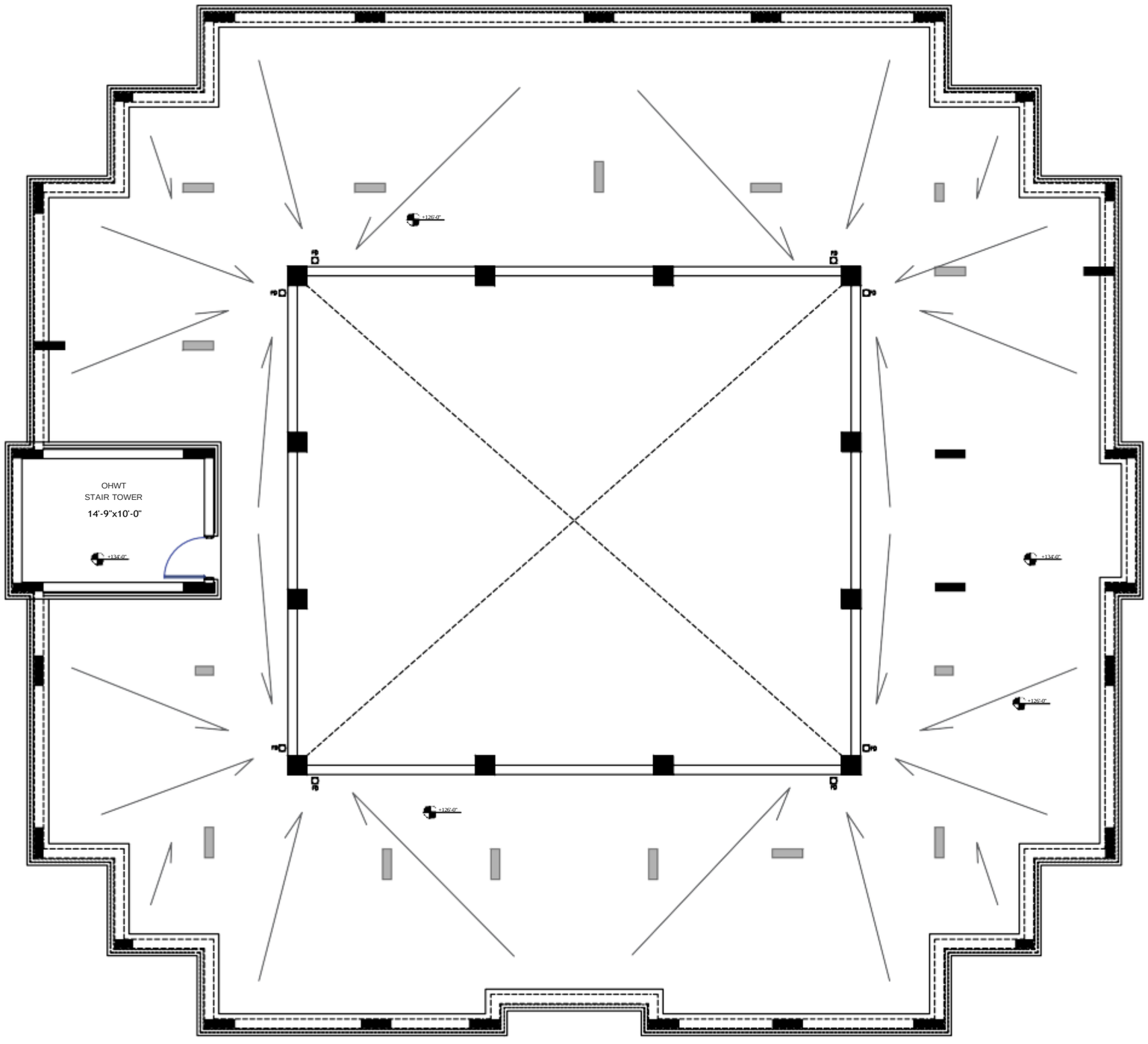
DISCIPLINE: PLUMBING

TITLE: COLD WATER LINE LAYOUT PLAN

SCALE: N.T.S

DATE: 08-08-2025

DWG-NO: PL-06



ADMINISTRATION BLOCK

Covered Area = 141 SFT

ROOF FLOOR

CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

DISCIPLINE: PLUMBING

TITLE: RAIN WATER LINE LAYOUT PLAN

SCALE: N.T.S

DATE:	DWG-NO
08-08-2025	PL-03

CONSTRUCION OF ADMIN BLOCK

IBA PUBLIC SCHOOL SUKKUR

ELECTRICAL

DRWING

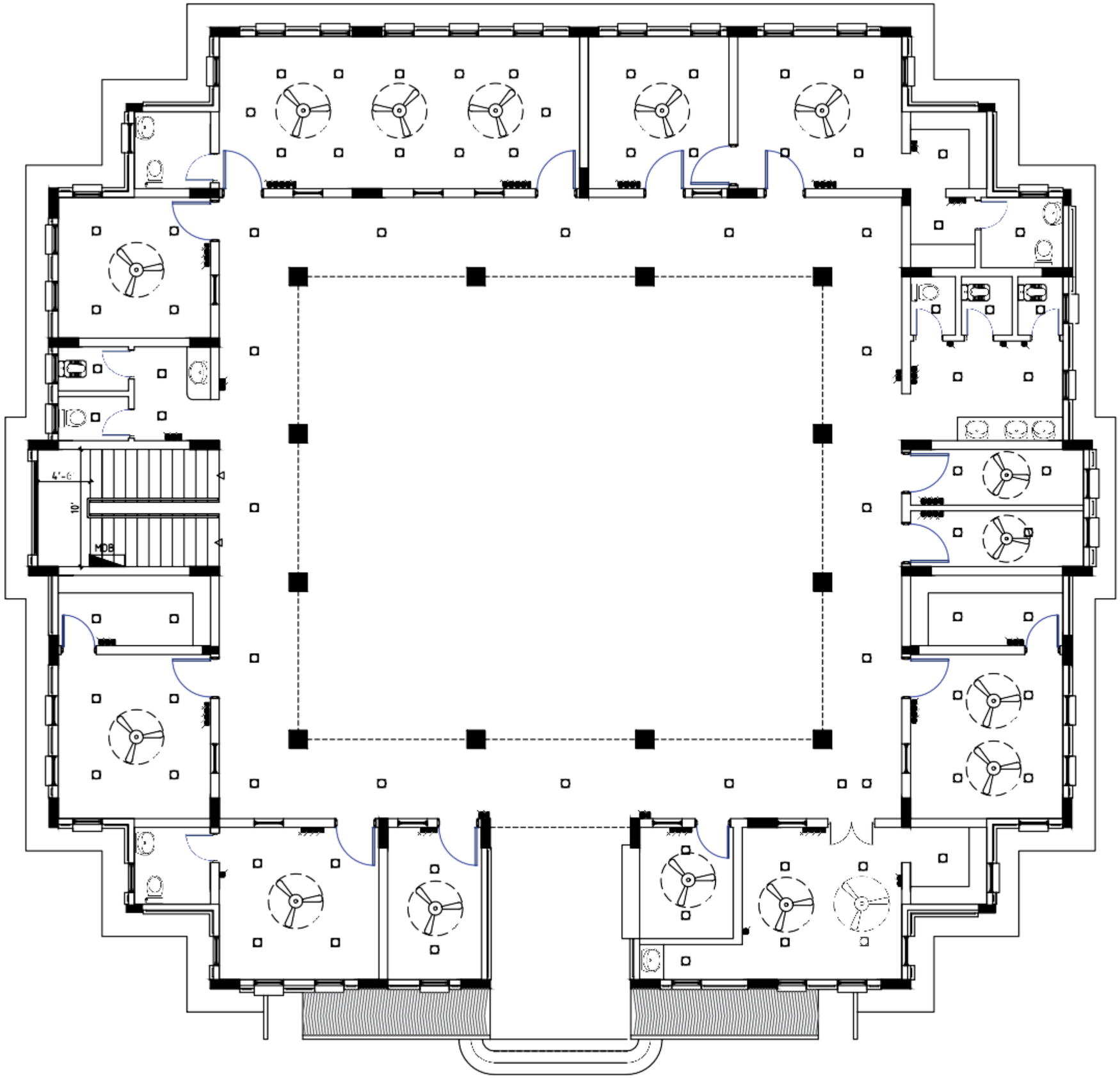
CLIENT

SUKKUR IBA UNIVERSITY

CONSULTANT

NBK CONSULTANTS

CONSULTING ENGINEERS, ARCHITECTS & PLANNERS



CLIENT:

Sukkur IBA University

SUKKUR IBA UNIVERSITY

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

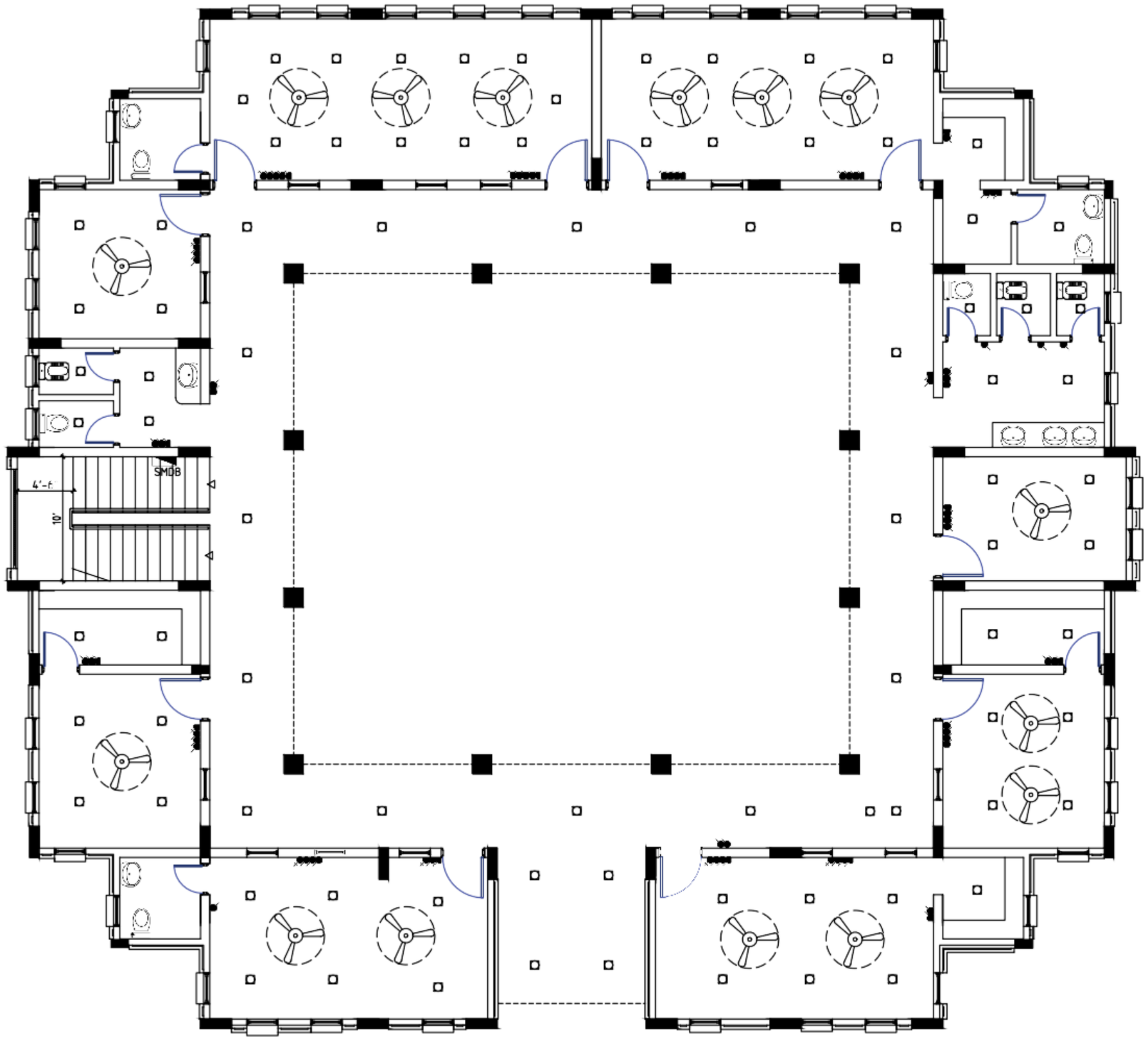
REV:	
ISSUE:	

DISCIPLINE: ELECTRICAL

TITLE: LIGHT & FAN LAYOUT

SCALE: N.T.S

DATE:	DWG-NO
08-08-2025	EL-01



CLIENT:

Sukkur IBA University

PROJECT:

CONSTRUCTION OF ADMIN BLOCK @ PUBLIC SCHOOL SUKKUR (MANAGE BY SUKKUR IBA UNIVERSITY

CONSULTANT:

NBK CONSULTANTS

Consulting Engineers, Architect & Planners

REV:	
ISSUE:	

DISCIPLINE: ELECTRICAL

TITLE: LIGHT & FAN LAYOUT

SCALE: N.T.S

DATE:	DWG-NO
08-08-2025	EL-02

SUKKUR IBA UNIVERSITY

MERIT - QUALITY - EXCELLENCE

No: SUK-IBA/Rgr/MC/1275/25 Date 18-11-2025

NOTIFICATION

Consequent upon the approval of the Vice Chancellor, Sukkur IBA University, the following Procurement Committee for all Development Works of Sukkur IBA University (Main Campus), all sub-Campuses and IBA Community Colleges and Schools has been reconstituted with effect from December 01, 2025.

The procurement Committee will comprise as under:

S. No	Name	Roles on Committee
1	**Engr. Ubedullah Soomro** Additional Project Director, Sukkur IBA University	**Convener**
2	**Mr. Hari Lal Nathani** Additional Director Procurement, Sukkur IBA University	**Member**
3	**Engr. Tahseen Ahmed Memon** Executive Engineer, Sukkur IBA University	**Member**
4	**Engr. Mansoor Ahmed Memon** Deputy Director (P&D)	**Member**
5	**Mr. Irfan Ullah** Director, HEC, Islamabad	**Member (External)** (for PSDP Projects)
	Engr. Haseeb Ansari Additional Director (P&D) NED University of Engineering and Technology, Karachi	**Member (External)** (for non PSDP Projects)

Functions and Responsibilities of the Procurement Committee (ToRs):

The procurement committee shall be responsible as per SPP Rule 8:

- Procurement Value Rs 1000000/- and above
- Preparing bidding documents.
- Carrying out a technical and financial evaluation of the bids.
- Preparing evaluation report as provided in Rule 45 of SPP Rules, 2010
- Making recommendations for the award of contract to the competent authority; and
- Perform any other function ancillary and incidental to the above.

This notification supercedes the previous notification # Suk-IBA/Rgr/MC/1104/25 dated: October 08, 2025.

Registrar (Acting)
Sukkur IBA University

Cc to:

1. PS to Vice Chancellor
2. All Concerned
3. Office File

SUKKUR IBA UNIVERSITY

MERIT - QUALITY - EXCELLENCE

No: SUK-IBA/Regr/Mc/562/25 Date 09-05-2025

NOTIFICATION

Consequent upon the approval of the Vice Chancellor, Sukkur IBA University, the following Grievance Redressal Committee has been reconstituted to streamline the procurement process of Sukkur IBA University, its Sub-Campuses, Community Colleges & Schools with effective from **May 08, 2025.**

The Grievance Redressal Committee will comprise as under:

S.No.	Name	Role on Committee
1.	**Prof. Dr. M. Abdul Rehman Soomrani** Pro Vice Chancellor (Sub Campuses) Sukkur IBA University	**Convener**
2.	**Representative of the Accountant General Sindh**	**External Member**
3.	**Independent Professional** (from relevant field)	**External Member**

Functions and Responsibilities of Grievance Redressal Committee/ToR:

Complaint Redressal Committee shall be responsible for:

SPPRA Rule 31(4) The Grievance Redressal Committee upon receiving a complaint from an aggrieved bidder may, if satisfied;

(a) prohibit the grievance redressal committee from acting or deciding in a manner, inconsistent with these rules and regulations;

(b) annul in whole or in part, any unauthorized act or decision of the procurement committee; Provided while re-issuing tenders, the procuring agency may change the specifications and other contents of bidding documents, as deemed appropriate.

(bb) recommend to the Head of Department that the case be declared a mis-procurement if material violation of Act, Rules Regulations, Orders, Instructions or any other law relating to public procurement, has been established; and

(c) reverse any decision of the procurement committee or substitute its own decision for such a decision; Provided that the grievance redressal committee shall not make any decision to award the contract.

SPPRA rule 31(5) The grievance redressal committee shall announce its decision within seven days and intimate the same to the bidder and the Authority within three working days. If the committee fails to arrive at the decision within seven days, the complaint shall stand transferred to the Review Committee which shall dispose of the complaint in accordance with the procedure laid down in rule 32, if the aggrieved bidder files the review appeal within ten (10) days of such transfer;

Sukkur IBA University, Nisar Ahmed Siddiqui Road, Sukkur-65200, Sindh Pakistan UAN : 071 (111-785-422) Fax : (071) 5804419
E-mail: info@iba-suk.edu.pk Website : www.iba-suk.edu.pk

SPPRA Rule 31(6) The Procuring Agency shall award the contract after the decision of the grievance redressal committee;

SPPRA Rule 31 (7) Mere fact of lodging of a complaint shall not warrant suspension of the procurement proceedings; Provided that in case of failure of the Grievance Redressal Committee to decide the complaint; the procuring agency shall not award the contract, until the expiry of appeal period or the final adjudication by the Review Committee.

This notification supersedes the previous notification No# SUK-IBA/Rgr/451/23 Dated 17-03-2023

09/05/2023

Registrar
Sukkur IBA University

Cc to:

1. ES to Vice Chancellor
2. All Concerned
3. Office file

Sukkur IBA University - Annual Procurement Plan 2025-26

Procurement Type	Item/Scheme Title	Procurement Description	Quantity (where applicable)	Estimated Unit Cost (where applicable)	Estimated Total Cost in Million	Funds Allocated in Million	Source of Funds	Proposed Procurement Procedure	Proposed Procurement Method	Tentative Timing of Procurement	Remarks
Works	Establishment of Nisar Ahmed Siddiqui Technology (NASTech) Park at SIBAU	Establishment of Nisar Ahmed Siddiqui Technology (NASTech) Park at Sukkur IBA University			505.8		Govt	Single Stage – One Envelope	National Bidding	First Quarter	
Service	SMS Gateway Service Solution for Sindh GovT Projects	SMS Gateway Service Solution for Sindh GovT Projects			15		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Mess Contract for IBA Community Colleges/ Schools	Mess Contract for IBA Community Colleges/ Schools			114.5		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Electric Items	Electric Items			11.043		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Plumbing Items	Plumbing Items			1.71		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Desktop Computers	Desktop Computers			54.399		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Electronics Items	Electronics Items			4.04		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Printers	Printers			1.1		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	UPS	UPS			2.1		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Battery for EV	Battery for EV			0.9		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Generator	Generator			5.5		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	EE Lab Items	EE Lab Items			2.5		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Surveillance Items	Surveillance Items			1.64		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Works	Construction of Hostel Block at IBA Public School Sukkur	Construction of Hostel Block at IBA Public School Sukkur			95.2		ADP	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Generator Parts	Generator Parts			1		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Supply & Installation of Solar System	Supply & Installation of Solar System			20		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Supply & Installation of Water Filter	Supply & Installation of Water Filter			2		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Carpentry Items	Carpentry Items			7.99		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Supply & Installation of Networking Items	Supply & Installation of Networking Items			1.62		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Furniture & Fixture	Furniture & Fixture			1		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	Desktop Computers	Desktop Computers			1.8		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Works	Rehabilitation of Boundary Wall at IBA Community College Naushero Feroze	Rehabilitation of Boundary Wall at IBA Community College Naushero Feroze			2.99		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Works	Renovation of Library and M&R at IBA Public School Larkana	Renovation of Library and M&R at IBA Public School Larkana			11.397		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Works	Establishment of Sukkur IBA University Campus at Mirpur Khas (Package- 1)	Establishment of Sukkur IBA University Campus at Mirpur Khas (Package- 1)			603.058		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Works	Establishment of Sukkur IBA University Campus at Mirpur Khas (Package- 2)	Establishment of Sukkur IBA University Campus at Mirpur Khas (Package- 2)			403.835		Others	Single Stage – One Envelope	National Bidding	First Quarter	
Goods	EE Lab Items	EE Lab Items			2.5		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Desktop Computers	Desktop Computers			3.4		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Networking Items with Installation	Networking Items with Installation			15.387		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	UPS	UPS			3.026		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Surveillance Items with Installation	Surveillance Items with Installation			1.1		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Supply & Installation of RO Plant	Supply & Installation of RO Plant			2		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Multimedia Projectors with Accesssories	Multimedia Projectors with Accesssories			2.5		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Electronics Items	Electronics Items			23.88		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Furniture & Fixture	Furniture & Fixture			3		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	IP PBX System with Accessories	IP PBX System with Accessories			1.679		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Printers	Printers			1.1		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Batteries	Batteries			1.5		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Bedding Items	Bedding Items			3.5		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Photocopiers Machines	Photocopiers Machines			2		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Electric Items	Electric Items			0.85		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Food Arrangement for Events	Food Arrangement for Events			3		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Service	Event Management Services	Event Management Services			9		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Mess Contract for IBA Community Colleges/ Schools- IBA CC Dadu	Mess Contract for IBA Community Colleges/ Schools- IBA CC Dadu			Rs 10 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Mess Contract for IBA Community Colleges/ Schools- IBA CC N. Feroze	Mess Contract for IBA Community Colleges/ Schools- IBA CC N. Feroze			Rs 11 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Mess Contract for IBA Community Colleges/ Schools- IBA CC Jacobabad	Mess Contract for IBA Community Colleges/ Schools- IBA CC Jacobabad			Rs 8 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Mess Contract for IBA Community Colleges/ Schools- IBA CC Ghotki	Mess Contract for IBA Community Colleges/ Schools- IBA CC Ghotki			Rs 8 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Mess Contract for IBA Community Colleges/ Schools- IBA CC Ubauro	Mess Contract for IBA Community Colleges/ Schools- IBA CC Ubauro			Rs 15 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Service	Event Management Services for IBA- Public School Sukkur	Event Management Services for IBA- Public School Sukkur			Rs 1.5 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
	Food Arrangement for Event for IBA- Public School Sukkur	Food Arrangement for Event for IBA- Public School Sukkur			Rs 14 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	

Procurement Type	Item/Scheme Title	Procurement Description	Quantity (where applicable)	Estimated Unit Cost (where applicable)	Estimated Total Cost in Million	Funds Allocated in Million	Source of Funds	Proposed Procurement Procedure	Proposed Procurement Method	Tentative Timing of Procurement	Remarks
Goods	Supply & Installation of Water Filter Plant	Supply & Installation of Water Filter Plant			Rs 2 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Electric Items	Electric Items			Rs 1.2 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Furniture & Fixture	Furniture & Fixture			Rs 4.5 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Desktop Computers	Desktop Computers			Rs 14.76 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Laptops	Laptops			Rs 3.2 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Establishment of DC Failover Site Data Center	Establishment of DC Failover Site Data Center			Rs 100 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Networking Items with Installation	Networking Items with Installation			Rs 15.387 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	IP PBX System with Accessories	IP PBX System with Accessories			Rs 1.679 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	DLD Lab Items	DLD Lab Items			Rs 3.822 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Desktop Computers	Desktop Computers			Rs 3.12 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	IT Items	IT Items			Rs 1.626 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Goods	Printing & Stationary	Printing & Stationary			Rs 1.135 M		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
	Food Arrangement	Food Arrangement			Rs 2 Million		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
Services	Event Management Services	Event Management Services			Rs 0.5 Million		Others	Single Stage – One Envelope	National Bidding	Second Quarter	
works	Construction of Sukkur IBA University Campus at Mirpur Khas (Package- 1)	Construction of Sukkur IBA University Campus at Mirpur Khas (Package- 1)			Rs 603.058 M		Others	Single Stage- Two Envelope	National Bidding	Second Quarter	
Works	Construction of Sukkur IBA University Campus at Mirpur Khas (Package- 2)	Construction of Sukkur IBA University Campus at Mirpur Khas (Package- 2)			Rs 403.835 M		Others	Single Stage- Two Envelope	National Bidding	Second Quarter	
Works	Construction of Hostel Block at IBA Public School Sukkur	Construction of Hostel Block at IBA Public School Sukkur			Rs 95.20 M		Others	Single Stage- Two Envelope	National Bidding	Second Quarter	
Works	Construction of Admin Block at IBA Public School Sukkur	Construction of Admin Block at IBA Public School Sukkur			Rs 95.209 M		Others	Single Stage- Two Envelope	National Bidding	Second Quarter	
Works	Renovation of Library and M&R at IBA Public School Larkana	Renovation of Library and M&R at IBA Public School Larkana			Rs 11.397 M		Others	Single Stage- Two Envelope	National Bidding	Second Quarter	
Works	Extension of Classrooms and Rehabilitation of Boundary Wall at IBA CC Dadu	Extension of Classrooms and Rehabilitation of Boundary Wall at IBA CC Dadu			RS 13.49 M		Others	Single Stage- Two Envelope	National Bidding	Second Quarter	

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