Sindh Madressatul Islam University

DEVELOPMENT OF SINDH MADRESSATUL ISLAM UNIVERSITY (SMIU) CAMPUS AT EDUCATION CITY MALIR, KARACHI (Gate Office & Boundary Wall – Remaining Works)

Tender Document

Volume-I

Conditions of Contract

EA Consulting Pvt Ltd

ARCHITECTURE | ENGINEERING | PROJECT MANAGEMENT

PAKISTAN | UAE | CANADA

Head Office AL-9, 15th Lane, Khayban-e-Hilal, Phase-VII, DHA,Karachi-75500, Pakistan

UAN +92 21 111 111 584 | Fax: +92 21 3584 1825 | info@eaworld.com | www.eaworld.com

January, 2025

TABLE OF CONTENTS

Description

INVITATION FOR BIDS

INSTRUCTIONS TO BIDDERS

A. General

IB.1 Scope of Bid
IB.2 Source of Funds
IB.3 Eligible Bidders
IB.4 Eligible Material, Equipment & S
IB.5 One Bid Per Bidder
IB.6 Site Visit

B. Bidding Documents

IB.7 Contents of Bidding Documents
IB.8 Clarification of Bidding Documents
IB.9 Amendment of Bidding Documents

C. Preparation of Bids

IB.10. Cost of Bidding
IB.11. Language of Bid
IB.12 Documents Comprising the Bid
IB.13 Bid Prices
IB.14 Currencies of Bid and Payment
IB.15 Bid Validity
IB.16 Bid Security
IB.17 Alternate Proposals by Bidder
IB.18 Format and Signing of Bid

D. Submission of Bids

IB.19 Sealing and Marking of Bids
IB.20 Deadline for Submission of Bids
IB.21 Late Bids
IB.22 Modification, Substitution and Withdrawal of Bids

E. Bid Opening and Evaluation

IB.23 Bid Opening
IB.24 Process to be Confidential
IB.25 Clarification of Bids
IB.26 Examination of Bids and Determination of Responsiveness

IB.27 Non-Material Non-Conformities
IB.28 Correction of Arithmetic Errors
IB.29 Evaluation and Comparison of Bids
IB.30 Abnormally Low Bids
IB.31 Unbalanced or Front-loaded Bids

F. Award of Contract

IB.32 Award Criteria
IB.33 Employer's right to annul the Bidding P
IB.34 Notification of Award
IB.35 Performance Security
IB.36 Signing of Contract Agreement
IB.37 Integrity Pact
IB.38 Instructions Not Part of Contract
IB.39 Corrupt & Fraudulent Practices

BIDDING DATA

EVALUATION CRITERIA AND QUALIFICATIONS UPDATING FORMS

LETTER OF BID AND SCHEDULES TO BID

LETTER OF BID

Schedule-A to Bid	: Schedule of Adjustment Data
Schedule-B to Bid	: Bill of Quantities
Schedule-C to Bid	: Construction Schedule
Schedule-D to Bid	: Method of Performing the Work
Schedule-E to Bid	: List of Major Equipment
Schedule-F to Bid	: Organization Chart of the Supervisory Staff and Labour
Schedule-G to Bid	: List of Subcontractors
Schedule-H to Bid	: Estimated Progress Payments
Schedule-I to Bid	: Construction Camp and Housing Facilities
Schedule-J to Bid	: Integrity Pact

STANDARD FORMS

FORM OF BID SECURITY
FORM OF PERFORMANCE SECURITY
LETTER OF ACCEPTANCE
FORM OF CONTRACT AGREEMENT
DAAB AGREEMENT
FORM OF MOBILIZATION ADVANCE GUARANTEE / BOND

CONDITIONS OF CONTRACT

GENERAL CONDITIONS
PARTICULAR CONDITIONS
Part-A: Contract Data
Part-B: Special Provisions

INVITATION
FOR
BIDS

SINDH MADRESSATUL ISLAM UNIVERSITY
Aiwan-e-Tijarat Road, Karachi-74000.
Phones: +92-21-99217501-02-03 Ext: 324 Fax:+92-21-99217504
Email: info@smiu.edu.pk , URL http://www.smiu.edu.pk/

NO. SMIU/PC/MC/ Pack-3 (RW)/Tend/2025/06 **Karachi, Dated: 7th. January-2025**

TENDER NOTICE

Sindh Madressatul Islam University, Karachi invites e-bids through E-Pak Acquisition & Disposal System (EPADS) on standard bidding documents from interested contractors/firms registered in the required PEC category and specialization as mentioned in column (7) below for the following works. The tender shall be based on the single stage – one envelope procedure under Rule No 46 (1) of SPPRA-Rules 2010 (amended-uptodate). Bidding documents can be viewed/downloaded from https://portalsindh.eprocure.gov.pk/#/: and also available and viewed from SMI, University's website: www.smiu.edu.pk

S. No.	Name of work	Estimated Cost	Bid security	Tender Fee	Time of completion	PEC category & specialization
(1)	(2)	(3)	(4)	(5)	(6)	(7)
01.	Development of Sindh Madressatul Islam University (SMIU) Campus at Education City Malir, Karachi (Gate office & boundary wall remaining work).	Rs. 74.192 (M)	2% of Bid Price	Rs.10,000/-	09 Months	C-5 and above with specialization codes CE09, CE10 and EE04

Electronic Bids should be submitted through EPAD only. Interested bidders are required to get registered themselves on EPAD system in the link https://sindh.eprocure.gov.pk/#/supplier/registration for submission of electronic bids.

1- The bids prepared in accordance with the instruction given in the bidding document must be submitted on EPADS only **by Tuesday, 28th. January-2025, by 02-30 PM**. The original instrument of tender fee and **bid security 2% of the bid price in shape of Call Deposit/Pay order/Demand Draft/Bank Guarantee issued by any scheduled bank of Pakistan** in favour of Sindh Madressatul Islam University Karachi. must reach the Procurement agency in sealed envelope prior to the deadline for the opening of the e-bids. The bids will be **opened on the same day at 03-00 PM** before Procurement Committee, representative of consultant and the bidders or their authorized representatives who wish to be present, in the conference room No. 2, SMIU, main city campus Aiwan-e- Tijarat Road Behind Habib Bank Plaza, Karachi.

2- **Eligibility Criteria:**

a. Valid registration with Pakistan Engineering Council (PEC) in prescribed category and the relevant field of specialization of work.
b. Registration with income tax department (NTN certificates) with activated status in Federal Board of Revenue.
c. Registration certificate of Sindh Revenue Board Government of Sindh STN Certificate.
d. Experience and past performance for each work:

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 natures of works each having minimum cost 50% of the estimated cost.

e. **Financial:** -

Average Annual Financial Turn over not less than equivalent cost of the scheme/project during last five years.

f. List of machinery and equipment available.

g. An affidavit certificate that the firm at present is not black listed by Government/ Semi Government / Autonomous / Private bodies and that the firm has not been involved in any litigation and arbitration with Government/ Semi Government / Autonomous / Private bodies.

h. In case of joint ventures, same conditions to be fulfilled by both the firms.

i. Affidavit with effect that all the documents/ particulars information furnished are true correct.

j. All documents from Sr. No. "a" to "i" mentioned in the eligibility Criteria of this NIT will be examined at the time of opening of tender.

3- Bid Validity Period is 90 days.

4- Conditional bid and bid **without earnest money** shall not be considered.

5- Procuring Agency reserves the right to reject all or any bids subject to the relevant provisions of SPPRA Rules-2010 (amended uptodate).

6- In case any unforeseen situation resulting in closure of office on the date of opening or if Government declares holiday, the tender shall be submitted/opened on the next working day at the same time and venue.

Project Coordinator
SMIU Malir Campus, Karachi.
Tel # 021-99217504 (ext. # 260)
Email: sldodani@smiu.edu.pk
Cell # 03332610991

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

(Note: These Instructions to Bidders along with Bidding Data 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** hereinafter called "the Employer" wishes to receive bids for theconstruction and completion of works as described in these Bidding Documents, and summarized in the **Bidding Data** hereinafter referred to as the "Works".

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

IB.2 Source of Funds

2.1 The Employer has applied for/received a funding from the source(s) in various currencies towards the cost of the project specified in the **Bidding Data** and it is intended that part of the proceeds of this funding will be applied to eligible payments under the Contract for which these Bidding Documents are issued.

IB.3 Eligible Bidders

3.1 This Invitation for Bids is open to all Bidders meeting the following requirements at the time of submission of Bids and thereafter:

(a) Duly prequalified for this bidding process;

(b) Duly licensed by the Pakistan Engineering Council (PEC) in the category relevant to the value of the Works in the relevant field of specialization.

However, a Foreign Constructor can submit provisional license with its Bid but the Foreign Constructor will be required to submit standard license after award of Contract and before start of work.

Foreign Constructor shall not be eligible to participatein bidding individually. Foreign Constructor shall enter into joint venture with Pakistani Constructor registered with the Pakistan Engineering Council in equivalent/compatible category and submit the joint venture agreement to the Employer before participating in bidding in accordance with PEC Construction and

Operation of Engineering Works Bye-laws, 1987;

Not Applicable

(c) Must be on Active Taxpayer List of the Federal Board of Revenue and provincial revenue authority/ board where applicable; and

(d) All partners constituting the Bidder including proposed subcontractors do not appear in the list of debarred/ blacklisted firms and individuals on the websites of PEC and Federal & Provincial Procurement Regulatory Authorities and have not been declared debarred/ blacklisted by foreign country, internationalorganizations or other foreign institutions.

IB.4 Eligible Materials, Equipment and Services

4.1 All materials, equipment and services to be supplied under this Contract shall have their origin in eligible countries described under paragraph 4.4 hereunder.

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

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

4.4 Eligible countries to participate in this bidding process are those which have been notified by Ministry of Interior, Government of Pakistan as Business-Friendly Countries (BVL); information can be accessed through following link:

http://www.dgip.gov.pk/Files/Visa%20Categories.aspx#L

IB.5 One Bid per Bidder

5.1 Each Bidder shall submit only one Bid either by himself, or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid (other than alternatives pursuant to Clause IB.17) will be disqualified.

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;
3. Evaluation Criteria and Qualification Updating Forms;
4. General Conditions (GC);
5. Particular Conditions (PC):
   - Part A - Contract Data;
   - Part B - Special Provisions;
6. Specifications (SP):
   - Part A - Specific Provisions;
   - Part B - Technical Provisions;
7. Letter of Bid;
8. Schedules to Bid;
9. Standard Forms:
   - (i) Form of Bid Security;
   - (ii) Letter of Acceptance;
   - (iii) Form of Contract Agreement;
   - (iv) Form of Performance Security;
   - (v) DAAB Agreement;
   - (vi) Form of Mobilization Advance Guarantee;
10. 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, Pre-Bid Meeting

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 the period specified in the **Bidding Data**, prior to the deadline for submission of bids.

8.2 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.

8.3 The Employer may, on his own 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, are as stipulated in the **Bidding Data**. All prospective Bidders or their authorized representatives shall be invited to attend such a pre-bid meeting.

8.4 The Bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than three (3) days before the proposed pre-bid meeting.

8.5 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 Sub-Clause 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.

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

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 listed in Sub-Clause IB.7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective Bidders shall acknowledge receipt ofeach addendum in writing to the Employer.

9.3 Such addendum shall be issued not later than number of days prior to the deadline for submission of bids, specified in the **Bidding Data**. To afford prospective Bidders reasonable timein which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission ofbids in accordance with Clause IB.20.

C. PREPARATION OF BIDS

IB.10 Cost of Bidding

10.1 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.

IB.11 Language of Bid

11.1 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** 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 duly certified translation of the relevant parts in the Bid language, in which case, for purposes of evaluation of the bid, the translation in Bid language shall prevail.

IB.12 Documents Comprising the Bid

12.1 Each Bidder shall:

(a) submit duly filled in, signed and stamped Letter of Bid and completed Schedules to Bid as required, including priced Bill of Quantities, in accordance with ClauseIB.18 hereof;

(b) submit Bid Security in accordance with Clause IB.16 hereof;

(c) submit alternative proposal, if permissible in accordance with Clause IB.17;

(d) Submit a written power of attorney authorizing the signatory of the Bid to act for and on behalf of the Bidder. The name and position held by each person signing the authorization must be typed or printed below the signature;

(e) submit the Qualification Updating Forms duly filled in, signed and stamped along with requisite attachments, to establish that the Bidder continues to meet the Eligibility and Qualification Criteria set out in the Pre- Qualification Documents and as provided in the Section"Evaluation Criteria and Qualification Updating Forms";

(f) furnish a technical proposal taking into account the various Schedules to Bid, especially the following:

Schedule-C to Bid, Proposed Construction Schedule; Schedule-D to Bid, Method of Performing the Work; Schedule-E to Bid, List of Major Equipment; Schedule-F to Bid, Organization Chart for Supervisory Staff; and other pertinent information, such as mobilization programme, etc.

12.2 Bids submitted by a joint venture of two (2) or more firms specified in **Bidding Data**, shall comply with the following requirements:

(a) the bid, and in case of a successful bid, the Form of Contract Agreement shall be signed by all members so as to be legally binding on all partners;

(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 Contract and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf ofthe 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 Letter of Bid and in the Form of Contract Agreement (in case of a successful bid); and

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

12.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the Bidders' proposals to meet the technical specifications and the completion time referred to in Sub-Clause IB.1.2 hereof.

IB.13 Bid Prices

13.1 The price and discount if any quoted by the Bidders in the Letter of Bid and in the Bill of Quantity shall conform to the requirement specified below:

13.2 The Bidder shall quote any discounts and the methodology for their application.

13.3 If bids are being invited for individual lots (contracts) or for any combination of lots, the Bidders can offer discounts for the individual lots (contracts) as well as for award of more than one Contract and shall specify in their bid.

13.4 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in Sub-Clause IB.1.1 hereof, based on the unit rates and/or prices.

13.5 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.

13.6 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 13.6 [*Adjustment for Changes in Laws*] of the Conditions of Contract.

13.7 The rates and prices quoted by the Bidders are subject to adjustment during the performance of the Contract inaccordance with the provisions of Sub-Clause 13.7 [*Adjustments for Changes in Cost*] of the General Conditions of Contract. The Bidders shall furnish the prescribed information for the price adjustment formulae in Schedule-A to Bid, and shall submit with their bids such other requisite supporting information if required under the said Schedule.

Not Applicable

IB.14 Currencies of Bid and Payment

14.1 The unit rates and the prices shall be quoted by the Bidder entirely in Pak Rupee and shall be paid accordingly in same currency.

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 in Table III of Schedule-A to Bid the proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements, in such case the unit rates and the prices shall be quoted by the Bidder in Equivalent PKR.

Not Applicable

14.2 The rates of exchange to be used by the Bidder for currency conversion shall be the TT Selling Rates published or authorized by the State Bank of Pakistan prevailing on the date twenty-eight (28) days prior to the deadline for submission of bids. Such rates shall be notified by the Employer not later than fourteen (14) days prior to the deadline for submission of Bids.

Not Applicable

For the purpose of payments, the exchange rates used in Bid preparation shall apply for the duration of the Contract.

IB.15 Bid Validity

15.1 Bids shall remain valid for the period stipulated in the **Bidding Data** after the date of Bid Opening specified in Clause IB.23.

15.2 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 normally may not be more than the original bid validity period. The request and the responses thereto shall be made in writing. A Bidder may refuse this request of the Employer without his Bid Security being forfeited. 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.16 in all respects.

IB.16 Bid Security

16.1 Each Bidder shall furnish, as part of his bid, a Bid Security in original form in the amount stipulated in the **Bidding Data** in PKR.

16.2 The Bid Security shall be in the form of Call Deposit Receipt (CDR) / Pay Order issued by a Scheduled Bank in Pakistan in favor of the Employer valid for a period 14 days beyond the Bid Validity date.

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

Not Applicable

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

16.4 The Bid Securities of the Bidders except the lowest three will be returned by the Employer within twenty-eight (28) days from the opening of Bids, provided a Bidder request for the return of its Bid Security, or upon the expiry of original validity of Bid Security or as extended, whichever is earlier.

16.5 The Bid Security of the lowest three Bidders including the successful Bidder will be returned when the successful Bidder has furnished the required Performance Security.

16.6 The Bid Security may be forfeited:

(a) if the Bidder withdraws his bid except as provided in Sub Clause IB.22.1;

(b) if the Bidder does not accept the correction of his Bid Price pursuant to Sub Clause IB.28.2 hereof; or

(c) in the case of successful Bidder, fails to furnish the required Performance Security.

16.7 In case of annulment, all Bids submitted and specially, Bid securities, shall be returned to the Bidders within 14 days of annulment.

IB.17 Alternative Proposals by Bidder

17.1 Unless otherwise specified in the **Bidding Data**, alternative proposal(s) shall not be considered.

17.2 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 alternative proposal(s) containing (a)

relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any otherrelevant details/conditions, provided always that the total sumentered on the Letter of Bid shall be that which represents complete compliance with the Bidding Documents.

17.3 Alternative proposal(s), if any, of the Bidder having submitted most advantageous Bid only may be considered by the Employer as the basis for the award of Contract to such Bidder.

IB.18 Format and Signing of Bid

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

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

18.3 No alteration is to be made in the Letter of Bid nor in the Schedules 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 Each Bidder shall prepare by filling in the forms completely and without alterations one (1) original and number of copies, specified in the **Bidding Data**, of the documents comprising the Bid as described in Clause IB.12 and clearly mark them "ORIGINAL" and 'COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

The Bidder shall also provide complete searchable PDF versions as well as Word, Excel etc., versions of the Bid if so required in the **Bidding Data**.

Not Applicable

18.5 The original of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorizedto sign on behalf of the Bidder pursuant to Sub-Clause IB.12.1(d) hereof. All pages of the Bid shall be initialed and stamped by the person or persons signing the bid.

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

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

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

18.9 All documents executed outside Pakistan required to be submitted with the Bid must be certified by Pakistan Embassy in the respective country(ies).

Not Applicable

D. SUBMISSION OF BIDS

IB.19 Sealing and Marking of Bids

19.1 Each Bidder shall submit his Bid as under:

(a) ORIGINAL and each copy of the Bid shall be separately sealed and put in separate envelopes and marked as such.

(b) The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed /identified as given in Sub Clause IB.19.2 hereof.

19.2 The inner and outer envelopes shall:

(a) be addressed to the Employer at the address provided in the **Bidding Data**;

(b) bear the specific identification of this bidding process as specified in the **Bidding Data**; and

(c) Provide a warning not to open before the time and date for bid opening, as specified in the **Bidding Data**.

Not Applicable

19.3 In addition to the identification required in Sub-Clause 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.

19.4 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) Bids must be received by the Employer at the address specified no later than the time and date stipulated in the **Bidding Data**.

(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 envelope.

Not Applicable

(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

21.1 (a) Any Bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 shall be declared late, rejected and returned unopened to such Bidder.

(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.

Not Applicable

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 Employerprior to the deadline for submission of bids.

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

Not Applicable

22.3 No Bid may be modified by a Bidder after the deadline for submission of Bids except in accordance with Sub Clauses IB.22.1 and 28.2.

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 Letter of Bid may result in forfeiture of the Bid security in pursuance to Clause IB.16.

E. BID OPENING AND EVALUATION

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 Bidders' 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. Only bids that are opened and read out at Bid opening shall be considered further.

Not Applicable

23.3 The Bidder's name, total Bid Price and price of any alternative 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. Only discounts and alternative proposals

read out at Bid opening shall be considered for evaluation.The Letter of Bid and the Summary Bill of Quantities are to be initialed by representative(s) of the Employer attending Bid opening. The Employer shall neither discuss the merits ofany Bid nor reject any Bid (except for late Bids, in accordance with Sub-Clause IB 21.1).

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

IB.24 Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of Contract shall not be disclosed to Bidders or any other person not officially concerned with such process before the announcement of the result of Bid evaluation in the form of final evaluation report giving justification for acceptance or rejection of Bids which shall be done at least fifteen (15) days prior to award of Contract. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices andrecommendations against all the Bids evaluated. Any effort by a Bidder to influence the Employer's processing of Bids or Contract 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 five (5) days after the announcement of the final evaluation report.

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 and lump sum prices. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The request for clarification and the response shall be in writing. 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 The Employer may, at his discretion, ask any Bidder for confirmation/submission of missing information to clarify its Bid. However, the Employer does not have an obligation to request any additional information or clarification with respect to missing or deficient information in a Bid. The Employer may reject any Bid as non-responsive if found materially incomplete, obscure, irregular or omitting any material information required to be submitted in accordance with the Bidding Documents.

25.3 If a Bidder does not provide clarifications of its Bid by the date and time set reasonably (not less than seven (7) days) in the Employer's request for clarification, the Employer may proceed with the evaluation based on the information submitted in the Bid without waiting for the Bidder's response.

IB.26 Examination ofBids and Determination of Responsiveness

26.1 Prior to the comparison of Bids, the Employer will determine whether each Bid is substantially responsive to the requirements of the Bidding Documents.

26.2 The Employer's determination of a Bid's responsiveness is to be based on the contents of the Bid itself, as defined in Sub- Clause IB.12.

26.3 A substantially responsive Bid is one which meets the requirements of the Bidding Documents, without material deviation, reservation or omission. A material deviation, reservation or omission is one that,

(a) if accepted, would:

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

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

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

26.4 During the evaluation of Bids, the following definitions apply:

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

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

(c) "Omission" is the failure to submit part or all of theinformation or documentation required in the BiddingDocuments.

26.5 The Employer shall examine the technical aspects of the Bid submitted in accordance with Sub-Clause IB.12.1(f), in particular, to confirm that all requirements stated in Specifications have been met without any material deviation, reservation or omission.

26.6 If a Bid is not substantially responsive to the requirements of the Bidding Documents, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation, reservation or omission.

IB.27 Nonmaterial Nonconformities

27.1 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities in the Bid.

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

documentation on such nonconformities shall not be relatedto any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

27.3 Provided that a Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component, by adding the average price of the item or component quoted by other lowest two evaluated substantially responsive Bidders. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Employer shall use a suitable CSR, adjusted to the date 28 days earlier to the Bid submission date or its best assessment.

IB.28 Correction of Arithmetic Errors

28.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errorswill 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.

(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.

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

28.2 The amount stated in the Letter of 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 Sub Clause IB.16.6(b) hereof.

IB.29 Evaluation and Comparison of Bids

29.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26. The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

29.2 In evaluating and comparing 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 arithmetic errors pursuant to Clause IB.28;

(b) price adjustment due to discounts offered in accordance with Sub-Clause IB.23.3;

(c) excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced daywork;

(d) making an appropriate price adjustment for any quantifiable non material non conformities in accordance with Sub-Clause IB.27.3; and

(e) the additional evaluation factors are specified in Section Evaluation Criteria and Qualification Updating Forms.

29.3 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 Bids' comparison.

Not Applicable

IB.30 Abnormally Low Bids

30.1 If the Bid Price of the successful Bidder is more than 15% below the lower of the Employer's estimate of the cost of work to be performed under the Contract or average of other lowest two evaluated substantially responsive Bids, 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 an additional Performance Security by 10% of the difference of the Bid Price as determined hereinabove up to issuance of Taking Over Certificate 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. The Bids having Bid Price lower than 25% shall be liable to be rejected.

IB.31 Unbalanced or Front Loaded Bids

31.1 If the Bid of the successful Bidder is seriously unbalanced (Front Loaded) in relation to the average of other evaluated substantially responsive Bids, the Employer during execution of contract may pay against measured quantities of significantly higher quoted line item(s) rate(s) with respect to same line item(s) rate(s) determined from the average of otherlowest two evaluated substantially responsive Bids as instructed by the Engineer. The balance line item(s) rate(s) may be paid against the same measured quantities at the time of issuance of Taking Over Certificate or as instructed by the Engineer.

F. AWARD OF CONTRACT

IB.32 Award Criteria

32.1 Subject to Clauses IB.33 and IB.39, the Employer will award the Contract to the Bidder who's Bid has been determined as most advantageous Bid (substantially responsive to requirements of the Bidding Documents with the lowest evaluated Bid Price).

IB.33 Employer's Right to Annul the Bidding Process

33.1 Notwithstanding Clause IB.32, the Employer reserves the right 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.

The Employer shall upon request communicate to any Bidder who submitted a Bid, the grounds for its rejection of all Bids but is not required to justify those grounds. Rejection of all Bids shall be notified to all Bidders promptly.

IB.34 Notification ofAward

34.1 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 "Accepted Contract Amount").

The Letter of Acceptance will also state the remedies with respect to Sub-Clauses IB.30 & IB.31 if applicable.

34.2 No negotiation with the Bidder having submitted most advantageous Bid or any other Bidder shall be permitted, however, Employer may have clarification meetings before issuing Letter of Acceptance to get clarified any item in the Bid evaluation report.

34.3 The Letter of Acceptance/ notification of award and its acknowledgement/acceptance by the Bidder will constitute the formation of the Contract, binding the Employer and the Bidder till signing of the formal Contract Agreement.

34.4 Upon furnishing by the successful Bidder of a Performance Security, the Employer will promptly notify the other Biddersthat their Bids have been unsuccessful and return their Bid securities in accordance with Sub-Clause IB.16.5.

IB.35 Performance Security

35.1 The successful Bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract and additional Performance Security if applicable under IB.30 as stated in the Letter of Acceptance, within a period of 28 days after the receipt of Letter of Acceptance.

35.2 Failure of the successful Bidder to comply with the requirements of Sub Clause IB.35.1 or Clauses IB.36 or IB.37 shall constitute sufficient grounds for the annulment of the award, forfeiture of the Bid security and to award the Contract to the Bidder having submitted next advantageous Bid.

IB.36 Signing of Contract Agreement

36.1 Within 14 days from the date of furnishing of acceptablePerformance Security under the Conditions of Contract, the Employer will notify the successful Bidder to depute its representative with appropriate Power of Attorney to sign the Contract Agreement in the form provided in the Bidding
Documents, incorporating all agreements between the parties.

36.2 The formal Agreement between the Employer and the successful Bidder shall be executed within 14 days of the receipt of the above stated notification by the successful Bidder from the Employer.

IB.37 Integrity Pact

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

IB.38 Instructions not Part of Contract

38.1 Bids shall be prepared and submitted in accordance with the Instructions to Bidders which are provided to assist the Bidders in preparing Bids but do not constitute part of the Contract.

IB.39 Corrupt and Fraudulent Practices

39.1 The Employer will reject a Bid if it determines that the Bidder recommended for award, or any of its personnel, or its agents,or its sub-contractors, service providers, suppliers and/or theiremployees, has, directly or indirectly, engaged in corrupt,fraudulent, collusive, coercive, or obstructive practices in competing for the contract under this bidding.

39.2 The Employer will blacklist and hence forthwith debar a Constructor or individual, at any time, in accordance with the prevailing Public Procurement Rules 2004.

BIDDING DATA

BIDDING DATA

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

IB Clause Reference	Bidding Data
1.1	**Name and address of the Procuring Agency:** Sindh Madressatul Islam University, Aiwan-e-Tijarat Road, Behind Habib Bank Plaza, Karachi
1.1	**Name of the Project and Summary of the Works:** Development of Sindh Madressatul Islam University (SMIU) Campus at Education City Malir, Karachi (Gate Office & Boundary Wall Remaining Work)
1.2	**Time for Completion for the Works**: 270 days (09 Months)
2.1	**Name of the Borrower/Source of Financing/Funding Agency:** Federal Government (HEC) PSDP funds.
3.1	Foreign Constructors are not allowed
8.1	**Time limit for clarification:** Seven (7) calender days prior to the Date of Opening of Tender.
8.3	**Pre-bidding Meeting:** Pre-bid meeting shall be held at Conference Room, SMIU Malir Campus, Education City Malir, Karachi on **Monday, 20th January 2025** at 11:30 A.M.
9.3	**Number of Days:** Five (05)
11.1	**Bid Language**: English
14.1	Bidders to quote entirely in Pak. Rupees
15.1	**Period of Bid validity:** Bid shall be valid for 90 days from the date of opening of bid.
16.1	**Amount of Bid Security:** Bid Security in form of Call Deposit / Pay Order/ Demand Draft/ Bank Guarantee issued by a Scheduled Bank in Pakistan, of the amount at **2% of the Bid Price** in favor of Sindh Madressatul Islam University which shall remain Valid for a period of 28 days beyond the validity period of bids mentioned in para 15.1 above. **List of Insurance Companies:** *(Not Applicable)*
17.1	**Alternative Proposal(s)** by the Bidder shall not be considered.
18.4	**Number of copies of the Bid to be completed and returned:** Each Bidder shall prepare by filling in the forms completely and without alterations. The bid, properly filled in, must be submitted **ONLY through e-Pak Acquisition & Disposal System (EPADS)** at or before deadline mentioned in the invitation to bid.

19.1	**Submission of Bids:** The original Technical and Financial bid, properly filled in, must be submitted **ONLY through e-Pak Acquisition & Disposal System (EPADS)** at or before **02:30 P.M on Tuesday 28th January-2025**. The bids will be opened promptly thereafter in public and in the presence of bidders' representatives who choose to attend in the opening at the Conference Room No. 02, first floor Main building at Sindh Madressatul Islam University, Aiwan-e- Tijarat Road Behind Habib Bank Plaza, Karachi.
19.2 (a)	**Procuring Agency's address for the purpose of submission:** Conference Room No. 2, First Floor, Main Building, Sindh Madressatul Islam University, Aiwan-i-Tijarat Road, Behind Habib Bank Plaza, Karachi.
19.2 (b)	**Name of the Contract:** Development of Sindh Madressatul Islam University (SMIU) Campus at Education City Malir, Karachi (Gate Office & Boundary Wall Remaining Work)
19.2 (c)	**Time and date for Bid Opening:** Bids shall be opened at **03:00 P.M on Tuesday 28th January-2025** in the **Conference Room No. 02, first floor Main building at Sindh Madressatul Islam University, Aiwan-e- Tijarat Road Behind Habib Bank Plaza, Karachi**
19.5	The Bidder shall submit with its **Technical Bid** the following documents (a) Original Bid Security as per 16.1 and 16.2 (b) Conditions of Contract (c) Specification- (Part A – Specific Provisions) (d) Proposed Construction Schedule (appendix –C-1) (e) Method of Performing the Work (appendix –D-1) (f) Availability of Critical Equipment (appendix –E-1 to 3) (g) Construction Camp and Housing Facilities (appendix –I-1) (h) List of Sub-contractors (as required) (appendix –G-1) (i) Organization Chart for Supervisory Staff (appendix –F-1) (j) Integrity Pact (appendix –J-1) The Bidder shall submit with its **Financial (Price) Bid** the following documents: (l) Letter of Price Bid (m) Bill of Quantities (n) Estimated Progress Payments (appendix –H-1)
20.1 (A)	**Deadline for submission of Bids:** Bids shall be submitted **ONLY through e-Pak Acquisition & Disposal System (EPADS)** not later than **02:30 P.M on Tuesday 28th January-2025.**
23.1	**Venue, time, and date of opening:** Bids shall be opened at **03:00 P.M on Tuesday 28th January-2025** in the **Conference Room No. 02, first floor Main building at Sindh Madressatul Islam University, Aiwan-e- Tijarat Road Behind Habib Bank Plaza, Karachi**

EVALUATION CRITERIA AND QUALIFICATION UPDATING FORMS

EVALUATION CRITERIA AND QUALIFICATION UPDATING FORMS

B. General

This Section contains Eligibility and Qualification Criteria that the Employer shall use to evaluate Bids and qualify Bidders in accordance with Clauses IB.26 of Instructions to Bidders.The Bidder shall provide all the information requested in the relevant forms contained in Bidder's Qualification Updating Forms provided herein.

The information provided in the forms shall be substantiated with valid documentary evidences otherwise the requirement will not be considered as complied.

Wherever a Bidder is required to state a monetary amount, Bidders shall indicate the PKR equivalent using the rate of exchange determined as follows:

- For financial data - Exchange rate prevailing on the last day of the respective calendar year (inwhich the amounts for that year is to be converted) was originally established.

Exchange rates shall be taken from the publicly available source identified in the Sub-ClauseIB.14.2. Any error in determining the exchange rates in the Bid may be corrected by the Employer.

C. Domestic Preference

A margin of preference of 7.5% (seven and a half percent) shall be granted to domestic Bidders (in case of JV, all partners are Pakistani Constructors), in accordance with and subject to the following provisions:

(c) The Bidders applying for such preference shall provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Employer, a Bidder qualifies for a domestic preference.

(d) After Bids have been received and reviewed by the Employer, responsive Bids shallbe classified into the following groups:

- **Group A: Bids offered by domestic Bidders eligible for the preference.**
- **Group B: Bids offered by other Bidders.**

All evaluated Bids in each group shall, as a first evaluation step, be compared to determine the lowest Bid, and the lowest evaluated Bids in each group shall be further compared with each other. If, as a result of this comparison, a Bid from Group A is the lowest, it shall be selected for the award. If a Bid from Group B is the lowest, as a second evaluation step, all Bids from Group B shall then be further compared with the lowest evaluated Bid from Group A. For the purpose of this further comparison only, an amount equal to 7.5% (seven and a half percent) of the respective Bid Price corrected for arithmetical errors, including unconditional discounts and excluding Provisional Sums and the cost of dayworks, if any, shall beadded to the evaluated price offered in each Bid from Group B. If the Bid from Group A is the lowest, it shall be selected for award. If not, the lowest evaluatedBid from Group B based on the first evaluation step shall be selected.

D. Evaluation Criteria

1. The Bidders must meet all the mandatory criteria

1.1 Mandatory Provisions/Eligibility

#	Description	Yes/No
(i)	**Registration with PEC**: Bidders must possess valid registration certificate of PEC in the category **C-5** or Above Single Entity: Must Meet Joint Venture: Must Meet	If "Yes" the applicant will be Eligible for further evaluation for qualification.
(ii)	**Registration with Revenue Board**: Bidders must possess valid registration certificate from FBR and Sindh Revenue Board. Single Entity: Must Meet Joint Venture: Must Meet	If "Yes" where applicable the applicant will be Eligible for further evaluation for qualification

2. Evaluation/Qualification Criteria:

#	Category	Weightage/Marks
(i)	Financial Soundness	30
(ii)	Work Experience	40
(iii)	Key Personnel	15
(iv)	Plant & Equipment	15
	Total	**100**

For Technical Qualification, Passing Marks 65 out of 100. Additionally, each applicant has to score a minimum of 50% in each category.

Similarly, for firms in Joint Venture (J.V) to qualify, following are minimum qualification requirements:-

i) Lead partner shall have to score a minimum of 65% of all qualifying criteria given above.
ii) Each of the partners in J.V shall score not less than 40% of all qualifying criteria given above.

2.1 Financial Soundness:

Sr. No.	Description	Maximum Marks
i)	Available Bank Credit Line (100 Million or Above) Provide Original Bank Credit Line Letter duly certified by regional Branch of Bank.	5
ii)	Average Working Capital in last 5 years (150 Million or above) Provide Firm Audited Financial Reports for the last 5 years.	10
iii)	Average Annual Financial Turnover in last 5 year – (75 Million or above) Provide Firm Audited Financial Reports for the last 5 years.	5
iv)	Litigation History where decision went against the Firm. (Affidavit on Rs.100 Stamp Paper) In case of JV both partners must meet the criteria	5
v)	Blacklisting from any Agency (Affidavit on Rs.100 Stamp Paper) In case of JV both partners must meet the criteria	5
	SUB-TOTAL:	**30**

2.1 Work Experience:

SR. NO.	DESCRIPTION	MAXIMUM	POINTS
a)	**Similar nature of works Completed in last 5 years:** 1 Project (60 Million or above) = 5 Points Or 2 Projects (35 Million or above) = 5 Points (Provide Work Orders / Completion Certificate)	**20**	**5**
b)	**Similar nature of works in Hand:** 1 Project (60 Million or above) = 5 Points Or 2 Projects (35 Million or above) = 5 Points (Provide Work Orders)	**15**	**5**
d)	**Status of enlistment with Government Organizations and other agencies.** 1 Enlistment x 1 Point	**5**	**1**
	SUB-TOTAL:	**40**	

2.2 Key Personnel:

SR. NO.	DESCRIPTION	MAXIMUM	POINTS
i)	**Engineers Registered with PEC** a. B.Sc Engr (Civil) with 5+ years' experience (2 marks for one engineer) b. B.Sc Engr (Civil) with 3+ years' experience (1 mark for one engineer) Marks for Experience less than specified will be considered on proportionate basis for PE (Between 6-9 years) & for RE (between 1-4 years)	**9**	2 1
ii)	**Diploma Engineers in Employment of the Firm** a. Site Supervisor (DAE Civil) with 5+ years' experience (1 mark for one DAE Civil) b. Surveyor (DAE Civil) with 3+ years' experience (1 mark for one DAE Civil) Marks for experience less than specified years will be considered on proportionate basis.	**6**	1 1
	SUB-TOTAL:	**15**	

Note:

1. Bidders are supposed to possess Qualification Certificates i.e PEC Certificate and Diploma Certificates with their CV.

2.3 Plant & Equipment:

S.NO	Equipment Type & Characteristics	Min. Nr. required	POINTS
1	Surveying Equipment (Including Total Station)	02 Set	2
2	Earth Moving Machinery (Showel, Grader, Excavator, Loader, backhoe)	02 No	2
3	Steel Cutting & Bending Machine Electrical	02 No	1
4	Dumper 2 ton capacity	01 No	1
5	Steel Shuttering including Scaffolding	50,000 SFT	2
6	Concrete Mixer Machine (One Bag Capacity)	02 No	1
7	Generator (100KVA)	01 No	1
8	Crane (Capacity 18 tons, Height 300 feet)	01 No	1
9	Plate Compactors	02 No	1
10	Water Browser	02 No	2
11	Concrete vibrators	01 No	1
SUB-TOTAL:			**15**

Note:

1. The marks mentioned in above table are for owned equipment.
2. Total equipment available with the bidder is to be listed along with its current mobilization on on-going projects. The Bidder shall provide further details of proposed items of equipment using the relevant Form provided hereunder.
3. The bidder must submit ownership documents for equipment own by it.
4. For Leased/Rental equipment, the bidder must submit lease/rental agreement(s). For leased/rental equipment bidder will get 50% marks.

Bidders Qualification Updating Forms

To establish its qualifications to perform the contract in accordance with Section (EvaluationCriteria and Qualification Updating Forms) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

Form ELI -1.1

Bidder Information Form

Date: _____
Bid Reference No. (if any) and title: _____
Page_____of_____ pages

Bidder's name
In case of Joint Venture (JV), name of each member:
Bidder's country of registration: *[indicate country of Constitution]*
Bidder's year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name:_____ Address:_____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents, in case of JV, JV agreement, in accordance with Sub-Clause IB 3.1.

Form ELI -1.2

Bidder's JV Information Form
(to be completed for each member of Bidder's JV)

Date: _____
Bid Reference No. (if any) and title: _____
Page_____ of_____pages

Bidder's JV name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information Name:_____ Address:_____ Telephone/Fax numbers: _____ E-mail address: _____

Form CON – 1

Pending

Litigation

Bidder's Name: _____
Date: _____
JV Member's Name_____
Bid Reference No. (if any) and title: _____
Page_____of_____pages

Pending Litigation, in accordance with Eligibility and Qualification Criteria			
5	No pending litigation in accordance with Eligibility and Qualification Criteria, Sub-Factor 2.1.		
6	Pending litigation in accordance with Eligibility and Qualification Criteria, Sub-Factor 2.1 asindicated below.		
Year of dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), Eq. PKR (exchange rate)**
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: Status of dispute: _____	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	

Form FIN – 3.1:

Financial Situation and Performance

Bidder's Name: _____
Date: _____
JV Member's Name_____
Bid Reference No. (if any) and title: _____
Page_____of_____pages

7 **Financial data**

Type of Financial information in (currency)	**Historic information for last year, (amount in currency, currency, exchange rate*, Eq. PKR)**
Statement of Financial Position (Information from Balance Sheet)	
Total Assets (TA)	
Total Liabilities (TL)	
Total Equity/Net Worth (NW)	
Current Assets (CA)	
Current Liabilities (CL)	
Working Capital (WC)	
Information from Income Statement	
Total Revenue (TR)	
Profits Before Taxes (PBT)	
Cash Flow Information	
Cash Flow from Operating Activities	

*Refer to IB 14.2 for the exchange rate

8 **Financial documents**

The Bidder and its parties shall provide copies of financial statements for last year pursuant to Eligibility and Qualification Criteria, Sub-factor 3.1. The financial statements shall:

8.1 **reflect the financial situation of the Bidder or in case of JV member, and not an affiliated entity (such as parent company or group member).**

8.2 **be independently audited or certified in accordance with local legislation.**

8.3 **be complete, including all notes to the financial statements.**

8.4 **correspond to accounting periods already completed and audited.**

11. Attached are copies of financial statements[1] for the last year required above; and complying with the requirements

[1] If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified.

Form FIN – 3.2:

Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Eligibility and Qualification Criteria.

No.	**Source of financing**	**Amount (Eq. PKR)**
1		
2		
3		

Form FIN – 3.3:

Current Contract Commitments / Works in Progress

Bidders and each member to a JV should provide information on their current commitments onall contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	**Name of Contract**	**Employer's Contact Address, Tel, Fax**	**Value of Outstanding Work [Current Eq. PKR]**	**Estimated Completion Date**	**Average Monthly Invoicing Over Last Six Months [Eq. PKR /month)]**
1					
2					
3					
4					
5					

LETTER OF BID AND SCHEDULES TO BID

LETTER OF BID

Bid Reference No. _____
[Name of Contract/ Works]

To: _____

_____

Gentleman,

9 Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Specifications, Schedules to Bid including Bill of Quantities, Drawings and Addenda Nos._____for the execution ofthe above-named Works, we, the undersigned, offer to execute and complete such Worksand remedy any defects therein in conformity with the said Bidding Documents and

Addenda for the sum of Equivalent PKR_____(Eq. Pak Rupees _____) or such other sum as may be ascertained in accordance with the said conditions.

10 We meet the eligibility requirements in accordance with IB.3.

11 We, including any Subcontractors for any part of the Contract, are not debarred/ blacklisted by the Employer, any Government/Semi Government/Public Department in Pakistan or foreign country, international organizations or other foreign institutions.

12 Our subcontractors or suppliers for any part of the Contract, if any, shall have nationalities from eligible countries, in accordance with IB.4.4.

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

14 As security for due performance of the undertakings and obligations of this Bid, we submit

herewith a Bid Security in the amount of PKR_____(Pak. Rupees. _____) drawn in your favour or made payable to you and valid for a period of_____days beginning from the date Bids are opened.

15 We undertake, if our Bid is accepted, to commence the Works and to complete the whole of the Works comprised in the Contract within the time stated in Contract Data.

16 We agree to abide by this Bid for the period of____days, inclusive of 14 days beyond Bid validity period (as mentioned at Sr. No. 6 above) and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

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

18 We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other Bidder for the Works.

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

20 We undertake that all the information and documents submitted with the Bid are genuine, and in case of incorrect information of fake documents we shall be liable for punitive action under the Applicable Law.

Dated this_____day of_____20_____

Signature: _____

in the capacity of_____duly authorized to sign Bids for and on behalf of

_____

(Name of Bidder in Block Capitals)
(Seal)

Address:_____

_____

_____

Witness:

Signature:_____

Name: _____

Address. _____

_____

Occupation_____

A-1
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Schedule of Cost Indexation

[The Employer is to engage a professional with experience in construction costs and the inflationary effect on construction costs when preparing the contents of the Schedule of Cost Indexation. In the case of very large and/or complex works contracts, it may be necessary to specify several families of price adjustment formulae corresponding to the different works involved.]

[The formulae for price adjustment shall be of the following general type:]

Pn= a + b Ln / Lo + c En/ Eo + d Mn/Mo + ...

where:

"Pn" is the adjustment multiplier to be applied to the estimated Contract value in the relevant currency of the work carried out in period "n", this period being a month;

"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

"b", "c", "d", ... are coefficients representing the estimated proportion of each cost element related to the execution of the Works as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

"Ln", "En", "Mn", are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particularPayment Certificate relates); and

Not Applicable

"Lo", "Eo", "Mo", are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

The weightings (coefficients) for each of the factors of cost stated in the following table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variation(s).

If the currency in which the Contract price is expressed is different from the currency of the country of origin of the indices, a correction factor will be applied to avoid incorrect adjustments of the Contract price. The correction factor shall be: Z_0 / Z_1, where,

Z_0 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price on the Base date, and

Z_1 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price on the Date of Adjustment.

A-2
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Table I. Local Currency (LC) For Bill Nos._____

[In the Table below, the Bidder shall (a) indicate amount of local currency payment, and the Employer shall (b) enter the Index description and source of indices for the different elements of cost, and (c) derive weightings for local currency payment including nonadjustable fixed portion. PEC Standard Procedure and Formula for Price Adjustment (Second Edition), May, 2022 as amended time to time shall be applied for preparation of the following Table.]

Not Applicable

Cost Element	Description	Weightages	Applicable index
1	2	3	4
(i)	Fixed Portion	.30	
(ii)	Local Labour**		
(iii)	Cement – in bags		
(iv)	Reinforcing Steel		
(v)	High Speed Diesel (HSD)		
(vi)	Bitumen		
(vii)	Aggregate		
	Total	**1.00**	

BILL OF QUANTITIES

9 **Preamble:**

9.3 **The Bill of Quantities shall be read in conjunction with the Conditions of Contract, Specifications and Drawings.**

9.4 **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 as given in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix as per the Contract.**

9.5 **The rates and prices as given 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.**

9.6 **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.**

9.7 **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, or the same shall be determined by the Engineer in accordance with Clause 13, General Conditions.**

9.8 **General directions and description of work and materials are not necessarily repeated nor summarised 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 Bill of Quantities.**

9.9 **Provisional sums included and so designated in the Bill of Quantities shall be expended inwhole or in part at the direction and discretion of the Engineer in accordance with Sub- Clause 13.4 of General Conditions of Contract.**

9.10 **The following abbreviations for units have been used in Bill of Quantities:**

Units		**Abbreviations**
Cubic Meter	=	cum
Square Meter	=	sqm
Kilogram	=	kg
Provisional Sum	=	PS
Lump-Sum	=	LS

C-1
Schedule-C to Bid

CONSTRUCTION SCHEDULE

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

Description	Time for Completion (days)
a) Whole Works	
b) Section A	
c) Section B	
d) _____	
e) _____	

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

D-1
Schedule-D 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:

(d) Organization Chart:

Shall indicate head office and field office personnel involved in management and supervision, engineering, equipment maintenance and purchasing.

(e) 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.

(f) Method of executing the Works:

The procedures for installation of equipment and machinery and transportation of equipment and materials to the site.]

E-1
Schedule-E to Bid

LIST OF MAJOR EQUIPMENT

[The Bidder will provide on Sheet E-2 of this Schedule *a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment.*

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Sheet E-3.]

E-2
Schedule-E to Bid

LIST OF MAJOR EQUIPMENT

Owned, Purchased or Leased

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						

E-3
Schedule-E to Bid

LIST OF MAJOR EQUIPMENT

Equipment details

Item of equipment		
Equipment information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured	
The following information shall not be applicable for equipment owned by the Bidder		
Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

[This Table shall be used for each item of Equipment separately]

F-1
Schedule-F to Bid

ORGANIZATION CHART FOR
THE
SUPERVISORY STAFF AND LABOUR

G-1
Schedule-G 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**

H-1
Schedule-H 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 PKR:

Quarter	Amounts (1,000 PKR)
1	2
1st	
2nd	
3rd	
4th	
5th	
6th	
7th	
8th	
9th	
Bid Price	

I-1
Schedule-I to Bid

CONSTRUCTION CAMP AND HOUSING FACILITIES

[The Bidder in accordance with Clause 6 of the Conditions of Contract shall provide description of his construction camp's facilities and staff housing requirements.

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

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

(h) Provision of Services.

- ***Electrical power (expected power load, etc.).***
- ***Water (required amount and system proposed).***
- ***Sanitation (sewage disposal system, etc.)***

(i) Construction of Facilities

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

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

(k) Other Items Proposed (Security services, etc.)]

Note:

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.

J-1
Schedule-J to Bid

INTEGRITY PACT

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

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

…… [Name of Bidder/Contractor] 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 Bidder/ Contractor] 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 feeor otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[Name of Bidder/Contractor] 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 Bidder/Contractor] 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 Bidder/Contractor] agrees to indemnify GoP for any loss or damage incurred by it on account of itscorrupt business practices and further pay compensation to GoP in an amount equivalent to ten timethe sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Bidder/Contractor] 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: ……
Signature: ……
[Seal]

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

STANDARD FORMS

BS-1

FORM OF BID SECURITY

Security Executed on _____
(Date)

Expiry on _____
(Date)

Name of Surety with Address: _____

_____

Name of Principal (Bidder) with Address _____

_____

Penal Sum of Security PKR_____(Pak Rupees _____
_____)

Bid Reference No. _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at therequest of the said Principal (Bidder) we, the Surety above named, are held and firmly boundunto_____ (hereinafter called the 'Employer') in the sum stated above for the payment of which sum well andtruly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointlyand severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Bidder has submitted the accompanying Bid dated_____for _____
_____(*Particulars of Bid*) to the said Employer; and

13 WHEREAS, the Employer has required as a condition for considering said Bid that the Bidder furnishes a Bid Security in the above said sum to the Employer, conditioned as under: that the Bid Security shall remain in force for a period fourteen (14) days beyond the Bid Validity date i.e., upto 90 days .

14 that the Bid Securities of the Bidders except the lowest three will be returned by the Employer within twenty eight (28) days from the opening of Bids, provided a Bidder request for the return of its Bid Security, or on the expiry of original validity of Bid Security or as extended, whichever is earlier;

15 that the Bid Security of the lowest three Bidders comprising the successful Bidder will be returned when the successful Bidder has furnished the required Performance Security; and

16 that in the event of failure of the successful Bidder to furnish the required Performance Security, the entire said sum be paid immediately to the said Employer pursuant to IB.16 and IB.35 of the Instructions to Bidders for the successful Bidder's failure to perform.

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

BS-2

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 decide, 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
(Schedule Bank/Insurance Company)

WITNESS:

Signature _____

16.2 Name _____

Title _____

_____
Corporate Secretary (Seal)

Corporate Guarantor (Seal)

2. _____

_____
Name, Title & Address

PS-1

FORM OF PERFORMANCE SECURITY

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor with address: _____

_____

Name of Principal (Contractor) with address:_____

_____

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

_____

Letter of Acceptance No._____Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the requestof 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 trulyto 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 theEmployer'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 thesaid Documents and any extensions thereof that may be granted by the Employer, with or withoutnotice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform andfulfill 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 theGuarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force andvirtue till all requirements of Clause11, Defects After Taking Over, of Conditions of Contract are fulfilled.

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

We,_____ (the Guarantor), waiving all objections and defense under the Contract, do hereby irrevocably and independently guarantee to payto 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 sumor sums up to the amount stated above, against the Employer's written declaration that the Principalhas refused or failed to perform the obligations under the Contract which payment will be effected bythe Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall decide, whether the Principal (Contractor) has dulyperformed his obligations under the Contract or has defaulted in fulfilling said obligations and theGuarantor 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 otherperson.

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

Guarantor
(Schedule Bank/ Insurance Company)

WITNESS:

Signature _____

1. _____

Name _____

_____

Title _____

Corporate Secretary (Seal)

Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

LOA-1

Letter of Acceptance

[Letterhead paper of the Employer]

NAME OF CONTRACT:_____

CONTRACT NUMBER:_____

TO :_____

Date:_____

Your Reference:_____

Our Reference:_____

We thank you for your Bid dated _____ for the execution and completion of the Works comprising the above-named Contract and remedying of defects therein,all in conformity with the terms and conditions contained in the Contract.

We have pleasure in accepting your Bid for the Accepted Contract Amount of:

_____
[currency and amount in figures]

_____
[currency and amount in words]

In consideration of you properly and truly performing the Contract, we agree to pay you the Accepted Contract Amount or such other sums to which you may become entitled under the terms of the Contract, at such times and as prescribed by the Contract.

We acknowledge that this Letter of Acceptance creates a binding Contract between us, and we undertake to fulfil all our obligations and duties in accordance with the terms of this Contract.

Signature:_____

Signed by: _____

For and on behalf of:_____

Date:_____

CA-1

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ (month) 20____ between _____ _____(hereinafter called the "Employer") of the one part and_____(hereinafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz.,_____ _____ should be executed by the Contractor and has accepteda Bid by the Contractor for the execution and completion of such Works and the remedying of anydefects therein.

NOW this Agreement witnessed as follows:

14 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.

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

15.1 This Contract Agreement;

15.2 The Letter of Acceptance;

15.3 The Letter of Bid;

15.4 The Particular Conditions Part A - Contract Data;

15.5 The Particular Conditions Part B - Special Provisions;

15.6 The General Conditions;

15.7 The Specifications Part A - Specific Provisions;

15.8 The Specifications Part B - Technical Provisions;

15.9 The Drawings;

15.10 The Completed Schedules to Bid including Schedule of Prices;

15.11 the JV Undertaking (if the Contractor is a JV); and

15.12 *[Employer to insert any other documents forming part of the Contract*]

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

16 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.

17 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 sumas 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 Contactor	Signature of Employer
(Seal)	(Seal)

Signed, Sealed and Delivered in the presence of:

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

DAAB Agreement **DAAB-1**

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

Name and details of the Contract _____

_____

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

Name and contact details of the Employer _____ (name)

_____ (*address*)

_____ (*telephone*)

_____ (*email / other contact details*);

Name and contact details of the Contractor _____ (name)

_____ (*address*)

_____ (*telephone*)

_____ (*email / other contact details*);

Name and contact details of the DAAB Member _____ (name)

_____ (*address*)

_____ (*telephone*)

_____ (*email / other contact details*);

("**DAAB Agreement**")

Whereas:

16 the Employer and the Contractor have entered (or intend to enter) into the Contract;

17 under the Contract, the "DAAB" or "Dispute Avoidance/Adjudication Board" means the sole member or three members (as stated in the Contract Data of the Contract) so named in the Contract, or appointed under Sub-Clause 21.1 [*Constitution of the DAAB*] orSub-Clause 21.2 [*Failure to Appoint DAAB Members*] of the Conditions of Contract;

18 the Employer and the Contractor desire jointly to appoint the above-named DAAB Member to act on the DAAB as:

18.1 the sole member of the DAAB, and where this is the case, all references to the "Other Members" do not apply; or

18.2 one of three members / chairman [*delete the one which is not applicable*] of the DAAB and, where this is the case, the other two persons are:

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

the "**Other Members**"; and

19 the DAAB Member accepts this appointment.

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

17 The conditions of this DAAB Agreement comprise:

17.2 Clause 21 [*Disputes and Arbitration*] of the Conditions of Contract, and any other provisions of the Contract that are applicable to the DAAB's Activities; and

17.3 the "General Conditions of Dispute Avoidance/Adjudication Agreement", which is appended to the General Conditions of the "Conditions of Contract for Construction"Second Edition 2017 published by FIDIC ("GCs"), as amended and/or added to by the following provisions.

18 [Details of amendments to the GCs, if any. For example:

In the procedural rules annexed to the GCs, Rule _ is deleted and replaced by: " … "]

19 The DAAB Member shall be paid in accordance with Clause 9 of the GCs. The currencyof payment shall be ___.

In respect of Sub-Clauses 9.1 and 9.2 of the GCs, the amounts of the DAAB Member'smonthly fee and daily fee shall be:

monthly fee_____per month, and

daily fee of_____per day

(or as otherwise set under Sub-Clause 9.3 of the GCs).

20 In consideration of the above fees, and other payments to be made to the DAAB Member in accordance with the GCs, the DAAB Member undertakes to act as DAAB Member in accordance with the terms of this DAAB Agreement.

21 The Employer and the Contractor shall be jointly and severally liable for the DAAB Member's fees and other payments to be made to the DAAB Member in accordance with the GCs.

22 This DAAB Agreement shall be governed by the law of _____(if not stated, the law that governs the Contract under Sub-Clause 1.4 of the Conditions of Contract).

DAAB-3

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

MG-1

FORM OF MOBILIZATION ADVANCE GUARANTEE/ BOND

Guarantee No._____ Date _____

WHEREAS_____(hereinafter called the 'Employer')

has entered into a Contract for _____
(Particulars of Contract)
with_____(hereinafter called the "Contractor').

AND WHEREAS, the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Pak Rupees_____(PKR_____) which amount shall be advanced to the Contractor as per provisions of the Contract.

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

AND WHEREAS, _____

(hereinafter called the "Guarantor") at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

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

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

This Guarantee shall remain in force until the advance is fully adjusted against payments from theInterim Payment Certificates of the Contractor or until_____whicheveris earlier.
(Date)

The Guarantor's liability under this Guarantee shall not in any case exceed the sum of PKR _____ (Pak Rupees _____ _____).

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 abovementioned date the advance payment is not fully adjusted.

Guarantor
(*Scheduled Bank/ Insurance Company*)

WITNESS:

Signature _____

1. _____

Name _____

_____

Title _____

Corporate Secretary (Seal)

Corporate Guarantor (Seal)

2. _____

_____
Name, Title & Address

CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

The Conditions of Contract comprise two parts:

18 General Conditions
19 Particular Conditions

General Conditions

These Conditions are the "General Conditions" which form part of the "FIDIC Conditions of Contractfor Construction for Building and Engineering Works Designed by the Employer Second Edition (2017 Red book, Reprinted 2022 with amendments)" published by:

International Federation of Consulting Engineers
(Fédération Internationale des Ingénieurs – Conseils) – (FIDIC)
World Trade Center II - Geneva Airport
P. O. Box 311
CH-1215 Geneva 15
Switzerland
Email: fidic@fidic.org, fidic.pub@fidic.org
Website: https://fidic.org/bookshop

The successful Bidder after award of Works shall have to provide two (02) copies of above said "General Conditions" for incorporation in the Contract.

Particular Conditions

(*Mandatory Provisions not to be amended/substituted except as instructed/permitted by PEC in writing*)

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

Part A - Contract Data

Sub-Clause	Data to be Given	Data
1.1.27	Defects Notification Period (DNP):	365 days
1.1.31	Employer's name and address:	**Sindh Madressatul Islam University, Aiwan-e-Tijarat Road, Behind Habib Bank Plaza, Karachi**
1.1.35	Engineer's name and address:	*EA Consulting Pvt Ltd.* AL-9، 15th Lane Khayaban-e-Hilal, D.H.A. Phase 7 Defence Housing Authority, Karachi, Sindh 75500
1.1.84	Time for Completion:	270 days for whole of the Works
1.3(d)	address of Employer for communications:	**Sindh Madressatul Islam University, Aiwan-e-Tijarat Road, Behind Habib Bank Plaza, Karachi**
	address of Engineer for communications:	*EA Consulting Pvt Ltd.* AL-9، 15th Lane Khayaban-e-Hilal, D.H.A. Phase 7 Defence Housing Authority, Karachi, Sindh 75500
	address of Contractor for communications:	_____ *[insert Contractor's address at the time of signing of the Contract]*
1.4	Contract shall be governed by the law of:	Islamic Republic of Pakistan
	ruling language:	English
	language for communications:	English

Sub-Clause	Data to be Given	Data
1.8	number of additional paper copies of Contractor's Documents:	Only via EPADS
2.1	after receiving the Letter of Acceptance, the Contractor shall be given right of access to all or part of the Site within:	Immediately after issuance of Notice to Commencement
2.4	Employer's financial arrangements	**Federal Government (HEC) PSDP funds.**
3.2 (e)(ii)	Engineer's Duties and Authority	Variation resulting in an increase of the Accepted Contract Amount in excess of one percent (1%) subject toaccumulative Variations not exceeding five percent (5%) of the Accepted Contract Amount
4.2	Performance Security (as percentage of the Accepted Contract Amount in Currencies)	Five percent (05%) To be submitted within 14 Calendar days from the Letter of Acceptance (LOA), in the form of irrevocable Bank Guarantee / Pay Order / Demand Draft from any scheduled bank of Pakistan.
4.2.1	List of Insurance Companies	1. _____ 2. _____ 3. _____ ***[Not Applicable]***
4.7.2	period for notification of errors in the itemsof reference	Twenty Eight (28) days
4.19	period of payment for temporary utilities	each month
4.20	number of additional paper copies of progress reports	***02 Nos. Copies***
5.1(a)	maximum allowable accumulated value of work subcontracted (as a percentage of the Accepted Contract Amount)	NOT APPLICABLE

Sub-Clause	Data to be Given	Data
5.1(b)	parts of the Works for which subcontracting is not permitted	NOT APPLICABLE
6.5	Normal working hours on the Site	*08 hours and 6 working days in a week*
8.3	number of additional paper copies of programmes	*03 Copies*
8.8 & 14.15(b)	Delay Damages payable for each day of delay	0.075% Of the Contract Value for each day of delay in completion of the works upto a maximum of 10% of the Contract Price stated in the Letter of Acceptance.
8.8	maximum amount of Delay Damages	Ten percent (10%) of the Accepted Contract Amount
8.14	Applicability of Incentives for Early Completion	**No**
12.3	Percentage profit	Ten percent (10%)
13.4.(b)(ii)	percentage rate to be applied to Provisional Sums for overhead charges and profit	Twenty Five percent (25%)
14.2	total Advance Payment	Not Applicable
14.2.1	List of Insurance Companies	1. _____ 2. _____ 3. _____ *Not Applicable*

Sub-Clause	Data to be Given	Data
14.2.3	percentage deductions for the repayment of the Advance Payment	Deduction shall be made at the amortization rate of 17.5 % of the value of the Works executed of each IPC as provided in paragraph (i) of Sub-Clause GCC 14.3, starting from 2nd IPC provided that the advance payment shall be completely repaid prior to the time when 90% of the Accepted Contract Amount less Provisional Sums has been certified for payment. It may be more than 17.5% in the last installment to ensure full repayment.
14.3	period of Interim payment	Monthly Basis
14.3(b)	number of additional paper copies of Statements	*Original plus one hard copy, plus one electronic*
14.3 (iii)	percentage of retention	Five percent (5%) of the Amount of Interim / Running payments.
14.3 (iii)	limit of Retention Money (as a percentage of the Contract Price)	Five percent (5%)
14.5(b)(i)	Plant and Materials for payment when shipped	Not Applicable
14.5(c)(i)	Plant and Materials for payment when delivered to the Site	Not Applicable
14.6.2	minimum amount of Interim Payment Certificate (IPC)	*As per monthly work done*
14.7(a)	period of payment of Advance Payment to the Contractor	Not Applicable
14.7b(i)	period for the Employer to make interim payments to the Contractor under Sub-Clause 14.6 [Interim Payment]	28 days
-	Stamp Duty	The formal agreement between Procurement Agency and the Successful Bidder shall be duly stamped at the rate of 0.35% of the Bid Price (updated from time to time) as stated in the Letter of Acceptance.

Sub-Clause	Data to be Given	Data
14.7b(ii)	period for the Employer to make interim payments to the Contractor under Sub-Clause 14.13 (Final Payment)	28 days
14.7(c)	period for the Employer to make final payment to the Contractor	56 days
14.8	financing charges for delayed payment	Not Applicable
14.11.1(b)	number of additional paper copies of draft Final Statements	*3 Copies*
14.15	currencies of payment of Contract Price	Pak Rupees
14.15(a)(i)	Proportions or amounts of Local and Foreign currencies	Not Applicable
14.15(c)	currencies and proportions for payment of Delay Damages	Not Applicable
14.15(f)	rates of exchange	Not Applicable
17.2(d)	forces of nature, the risks of which are allocated to the Contractor	Nil
19.1	permitted deductible limits: 19 insurance required for the Works 20 insurance required for Goods 21 insurance required forliability for breach of professional duty 22 insurance required against liability for fitness for purpose (if any is required) 23 insurance required for injury to persons and damage to property 24 insurance required for injury to employees 25 other insurances required by Laws and by local practice	 Ten percent (10%) of loss amount on each & every loss Nil Nil Nil Nil Nil Nil

Sub-Clause	Data to be Given	Data
19.1	Periods for submission of insurance: 23 evidence of insurance 24 relevant policies	Not later than the Commencement Date Within twenty eight (28) day from the Commencement Date
19.2.1(b)	additional amount to be insured (as a percentage of the replacement value)	15% of the replacement value (Accepted Contract Amount)
19.2.2	extent of insurance required for Goods amount of insurance required for Goods	from Ex-Works (i.e., works, factory, warehouse, etc) to delivery at the Site Full replacement value
19.2.3(a)	amount of insurance required for liability for breach of professional duty	Full replacement value of the Works to be designed by the Contractor
19.2.3(b)	insurance required against liability for fitness for purpose	Yes
19.2.3	period of insurance required for liability for breach of professional duty	Until the date of issuance of Performance Certificate
19.2.4	amount of insurance required for injury to persons and damage to property	Injury to person and Fatal case: in accordance with Workmen Compensation Act Damage to Property: _____ [*Employer to insert amount(s) as per his assessment of the adjoining property(ies) other than the Works*] without limit to the number of incidents
19.2.6	other insurances required by Laws and by local practice	All insurances as applicable, to the extent of execution of the project, under Federal and Provincial laws of Islamic Republic of Pakistan
21.1	time for appointment of the DAAB	Within 28 days from the Commencement Date. In case the Accepted Contract Amount is lesser than PKR one (01) billion, appointment of the DAAB shall be made when Dispute arises between the Parties.

Sub-Clause	Data to be Given	Data
21.1	the DAAB shall comprise	_____ *[insert either "a sole Member" or "Three Members"]* *[For a Contract estimated to costabove PKR 2.5 billion, the DAAB shall comprise of three members. For a Contract estimated to cost between PKR 1 billion and PKR 2.5 billion, the DAAB may comprise of three members or a sole member. For a Contract estimated to cost less than PKR 1 billion, a sole member isrecommended.]*
21.1	List of proposed members of DAAB 24 proposed by Employer 25 proposed by Contractor	*[to be inserted at the time of signing of the Contract]* 1._____ 2._____ 3._____ 1._____ 2._____ 3._____
21.2	Appointing entity (official) for DAAB members	Chairman Pakistan Engineering Council (PEC) from the list of PEC approved arbitrators published at its website
21.6	Rules of Arbitration	PEC Rules of Conciliation and Arbitration or Pakistan Arbitration Act of 1940, if the former is inactive. The place of Arbitration shall be in the Employer's country: _____ *[Insert name of city]*

Particular Conditions

Part B - Special Provisions

1.1 Definitions

1.1.76 "Specification"

Following is added at the end:

"and consists of two parts i.e.,

i) "Part A - Specific Provisions"; and

ii) "Part B - Technical Provisions"."

1.2 Interpretation

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

Sub-paragraph (k) is added:

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

1.5 Priority of Documents

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

(a) the Contract Agreement;
(b) the Letter of Acceptance;
(c) the Letter of Bid;
(d) the Particular Conditions Part A - Contract Data;
(e) the Particular Conditions Part B - Special Provisions;
(f) the General Conditions;
(g) the Specification Part A - Specific Provisions;
(h) the Specification Part B - Technical Provisions;
(i) the Drawings;
(j) the completed Schedules to Bid including Bill of Quantities;
(k) the JV Undertaking (if the Contractor is a JV); and
(l) any other documents forming part of the Contract.

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

1.6 Contract Agreement

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

3.1 The Engineer

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

3.2 Engineer's Duties and Authority

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

(a) Consenting to the subcontracting of any part of the Works

under Sub-Clause 5.1 [Subcontractors]

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

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

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

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

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

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

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

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

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

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

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

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

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

4.2 Performance Security

4.2.1 Contractor's Obligations

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

The Performance Security shall be, at the option of the Contractor, issued in the prescribed form included in the Bidding Documents, by a Scheduled Bank in Pakistan.

In case of Joint Venture, the Performance Security shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.

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

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

4.3 Contractor's Representative

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

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

4.4 Contractor's Documents

4.4.2 As-Built Records

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

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

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

Following Sub-Clause is added:

4.4.4 Shop Drawings

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

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

4.8 Health and Safety Obligations

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

In the event of work being carried out outside the normal working hours and in the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer.

4.20 Progress Reports

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

(i) planned programme for the execution of the Works for next 56 days to enable the Engineer to determine its programme of inspection and testing;

(j) monthly summery of daily job record indicating weather conditions, deployment of Contractor's Equipment, labour employment, local material procurement and material import, if any; and

(k) salient contractual and project information.

5.1 Subcontractors

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

"under Schedule to Bid"

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

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

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

5.2 Nominated Subcontractors

5.2.2 Objection to Nomination

In sub-paragraph (c), "and" is deleted from the end of (i);

"." at the end of (ii) is replaced with: ", and".

The following is then added as (iii):

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

6.1 Engagement of Staff and Labour

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

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

6.7 Health and Safety of Personnel

The existing text is substituted with the following:

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

6.8 Contractor's Superintendence

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

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

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

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

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

6.12 Key Personnel

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

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

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

6.13 Foreign Personnel

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required

residence visas and work permits. The Employer will, if requested by the Contractor, use all reasonable endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.

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

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

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

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

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

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

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

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

6.21 Forced Labour The Contractor, including its Subcontractors, shall not employ or engage forced labour which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

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

6.23 Employment Records of Workers

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

6.24 Workers' Organizations

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

6.25 Non-Discrimination and Equal Opportunity

The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices.

Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure nondiscrimination and equal opportunity, including for specific groups such as women, persons with disabilities, migrant workers and children (of working age in accordance with Sub-Clause 6.22).

6.26 Epidemics

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

7.7 Ownership of Plant and Materials

The following is added before the first paragraph:

"Except as otherwise provided in the Contract,"

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

"No Plant and/or Materials that is the property of the Employer shall be removed from the Site. If it becomes necessary to:

(i) remove any item of such Plant from the Site for the purposes of repair, the Contractor shall give a Notice, with reasons, to the Engineer requesting consent to remove the defective or damaged item off the Site. This Notice shall clearly identify the item of defective or damaged Plant, and shall give details of: the defect or damage to be repaired; the place to which defective or damaged item of Plant is to be taken for repair; the transportation to be used (and insurance cover for such transportation); the proposed

inspections and testing off the Site; and the planned duration required before the repaired item of Plant shall be returned to the Site. The Contractor shall also provide any further details that the Employer may reasonably require; or

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

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

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

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

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

The following Sub-Clause 8.14 is added after Sub-Clause 8.13:

8.14	**Incentives For Early Completion**	If Contract Data does not state applicability of incentives for early completion, this Sub-Clause shall not apply. The Contractor shall be entitled subject to Sub-Clause 20.2 [*Claims for Payment and/or EOT*] to bonus payment if the Works and/or each Section is completed earlier than the Time for Completion for the Works or Section (as the case may be). The amount of bonus for early completion of the Works and/or each Section shall be upto a limit and at a rate to 50% of the relevant limit and rate of delay damages prescribed in Contract Data and shall be paid for every day which shall elapse between the relevant Date of Completion of the Works or Section and the relevant Time for Completion. For the purposes of calculating any bonus payment, the applicable Time for Completion stated in the Contract Data is fixed and no adjustments of this time by reason of granting an EOT will be allowed.

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

11.12 Supervisory Assistance During DNP

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

12.2 Method of Measurement

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

"Summary of measured quantity for payment shall be delineated item-wise under four heads namely; "Schedule of Prices Quantity", "Quantity Executed To-date", "Quantity Certified Previously" and "Net Quantity Executed under this Certificate".

12.3 Valuation of the Works

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

"Sum of overhead charges and profit for sub-paragraph (a) shall be Twenty Five percent (25%)".

13.4 Provisional Sums

The following paragraph is inserted as the penultimate paragraph:

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

13.6 Adjustments for Changes in Laws

The following paragraphs are added at the end of the Sub- Clause:

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

14.1 The Contract Price

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

"Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry an approved re-export bond or bank guarantee, valid until the Time for Completion plus six months, in an amount equal to the full import duties and taxes which would be payable on the

assessed imported value of such Contractor's Equipment and spare parts, and callable in the event the Contractor's Equipment is not re-exported from the Country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon re-export of individual items of Contractor's Equipment or spare parts, or upon the completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare part to be re-exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable Laws. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to re-exported; and (b) on the initial imported value of the Contractor's Equipment and spare parts remaining in the Country after completion of the Contract. Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining."

[The Employer may change or delete this Sub-Clause as per Project requirements]

14.2 Advance Payment

14.2.1 Advance Payment Guarantee

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

The Advance Payment Guarantee shall be in the form of Guarantee issued by a Scheduled Bank in Pakistan. In case of Joint Venture, the Advance Payment Guarantee(s) shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.

14.2(a) Secured Advance on Materials

a) The Contractor shall be entitled to receive from the Procuring Agency Secured Advance against an indemnity bond acceptable to the Procuring Agency 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 Procuring Agency and these materials shall not be removed from the Site or otherwise disposed of without written permission of the Procuring Agency; 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 consumption basis.

14.6 Issue of IPC

14.6.1 The IPC

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

14.7 Payment

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

14.8 Delayed Payment

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

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

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

15.2 Termination for Contractor's Default

15.2.1 Notice

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

"For the purposes of this Contract, corrupt and fraudulent practices have been defined in Public Procurement Rules 2004."

15.2.3 After Termination

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

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

15.4 Payment after Termination

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

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

16.2 Termination by Contractor

16.2.1 Notice

The sub-paragraph (j) is deleted in its entirety.

At the end of sub-paragraph (i) "; or" is replaced with "." and at the end of sub-paragraph (h) ";" is replaced with "; or".

In sub-paragraph (f) "84 days" are replaced with "180 days" and text "for reasons not attributable to the Contractor" is added at the end.

16.3 Contractor's Obligations After Termination

Sub-paragraph (c) is deleted and replaced with:

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

(d) remove all other Goods from the Site, except as necessary for safety, and leave the Site."

17.1 Responsibility for Care of the Works

After the two instances of "Goods" in the last paragraph, the words "Employer-Supplied Materials and/or Employer's Equipment" are added.

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

17.7 Use of Employer's Accommodation/ Facilities

The Contractor shall take full responsibility for the care of the items of the Employer's facilities and/or accommodation, if any, as detailed in the Specification, from the date of use and/or occupation by the Contractor until the date on which such use and/or occupation is re-vested in the Employer.

If any loss or damage happens to any of the above items during a time while the Contractor is responsible for its care, arising from any cause other than a cause for which the Employer is responsible or liable, the Contractor shall promptly rectify the loss or damage at the Contractor's risk and cost.

18.1 Exceptional Events

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

18.4 Consequences of an Exceptional Event

The following is added at the end of sub-paragraph (b) after deleting the ".":

", including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Exceptional Events, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 19.2 [*Insurance to be provided by the Contractor*]."

18.5 Optional Termination

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

19.1 General Requirements

Following text is added at the end of first paragraph:

"The Contractor shall immediately after the date of the Letter of Acceptance submit the draft of insurance policies for the Employer's consent."

Following text is added at the end of third paragraph:

"The Contractor shall, within the respective periods stated in the Contract Data submit to the Engineer and the Employer a) evidence that the insurances described in this Clause have been effected, and b) copies of policies of the insurances described in Sub-Clauses 19.2.1, 19.2.4 and 19.2.5."

19.2 Insurance to be provided by the Contractor

19.2.5 Injury to employees

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

The following Sub-Clause is added after Sub-Clause 19.2.6:

19.2.7 Insurance Company

"The Contractor shall be obliged to place all insurances described in this Clause with insurers listed in the Contract Data and rated by PACRA/VIS of rating as provided in Table below:

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

21.6 Arbitration

The word "international" is deleted in the sixth line of first paragraph. The text of sub-paragraph (a) is substituted with the following:

"the Dispute shall be finally settled under the Rules of Arbitration, specified in the Contract Data;"

The following Clauses are added after Clause 21

22 Custom Duty

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

23 Taxes

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

24 Integrity Part

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

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

(b) terminate the Contract; and

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

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

Sindh Madressatul Islam University

DEVELOPMENT OF SINDH MADRESSATUL ISLAM UNIVERSITY (SMIU) CAMPUS AT EDUCATION CITY MALIR, KARACHI (Gate Office & Boundary Wall – Remaining Works)

Tender Document

Volume-II

Technical Specifications

EA Consulting Pvt Ltd

ARCHITECTURE | ENGINEERING | PROJECT MANAGEMENT

PAKISTAN | UAE | CANADA

Head Office AL-9, 15th Lane, Khayban-e-Hilal, Phase-VII, DHA,Karachi-75500, Pakistan

UAN +92 21 111 111 584 | Fax: +92 21 3584 1825 | info@eaworld.com | www.eaworld.com

SPECIFICATIONS FOR STRUCTURE WORKS (CIVIL)

Table of Contents

1.	Section-1	General	SP-C-02 to 04
2.	Section-2	Site Clearing, Grubbing and Setting out of Works	SP-C-05 to 06
3.	Section-3	Excavation, Filling, Backfill and Disposal	SP-C-07 to 09
4.	Section-4	Termite Control	SP-C-10 to 11
5.	Section-5	Water	SP-C-12 to 12
6.	Section-6	Concrete	SP-C-13 to 31
7.	Section-7	Steel Reinforcement	SP-C-32 to 34
8.	Section-8	Dismantling and demolishing Works	SP-C-35 to 35
9.	Section-9	Structural Steel Works	SP-C-36 to 43

SECTION – 1

1.0 GENERAL

1.01 This General Specification is to be taken as applying to all the works in this Contract. Figured dimensions on the working drawings shall be followed in preference to the scale.

1.02 Until and unless specified otherwise, all goods and materials are to be Pakistan manufactured and to be of the best quality, and where not otherwise specified shall be according to latest engineering practice and conforming to Pakistan Standards (P.S) or British Standard Specifications (B.S.S) or Standard of American Society of Testing Materials (ASTM). The Engineer or the Consultants may also supplement such specifications during the progress of work.

1.03 All materials and goods used for such and other items shall be subjected to standard testing and if found below the specified standard such as PS or BSS or ASTM or their equivalent shall be removed from the site immediately at Contractor's own expense. All testing of materials finished and unfinished, shall be carried out by the Contractor at his cost, in the presence of Engineer or Engineer's Representative for which the Contractor shall maintain a reasonably well equipped laboratory of his own, close to the site of work or make any other additional arrangement to the satisfaction and convenience of the Engineer. The Contractor shall include testing charges in his quotations and shall not be entitled to any reimbursement on this account for routine testing.

1.04 The Contractor must give early attention to the submission of samples of materials for approval of the Engineer, indicating the names of the manufacturing firms, where applicable especially of cement, sand, aggregates, steel, water, tiles, hard-core and all fittings. Whenever practicable, samples shall be submitted at least three weeks before it is proposed to use the materials. Until and unless specified otherwise and whenever materials are ordered to be forwarded to a testing laboratory other than site laboratory for check / testing.

1.05 The Contractor must take all steps necessary to prevent damage or interference with all supply lines such as water, electric power, fuel, telephones, drains, buried cables and any construction designed for the use of the public, government or semi government authorities or the Employer. The Contractor shall be responsible for any damage caused to such services or constructions and settle all claims in respect of such damage.

1.06 The Contractor shall protect from injury by covering all work, internally and externally needing protection including new concrete, brickwork, surface renderings, floors,

etc., to the satisfaction of the Engineer, including the work of his sub-contractors at his own cost.

1.07 The whole work shall be carried out in the best manner in accordance with the instructions contained in these documents and those given by the Engineer from time to time during the progress of the work. The work shall be carried out in conformity with the best of the standard construction practices preferably the British Codes of Practices.

1.08 The Contractor shall submit to the Engineer for his approval before beginning the work, a complete plan of the proposed sequence and methods of operations for the execution of the works. Detailed drawings showing the location and construction of dumping and working platforms, gantries, building and all other structures in connection with the Contractor's plant and material storage sheds shall also be submitted to the Engineer for his approval before construction.

1.09 Orders and directions may be given orally by the Engineer or his Representative, and shall be received and promptly obeyed by the Contractor or his Representative or any superintendent or foreman or any supervisor of the Contractor whosoever may have charge of the particular part or section of work in relation to which the orders or directions are given, and a confirmation in writing of such order or directions will be given to the Contractor by the Engineer, if so requested. The Contractor shall provide and maintain at his own expense during the performance of the work an office in the vicinity of work. Orders or directions, written or oral, from the Engineer or his Representative delivered at such office shall be considered as delivered to the Contractor. The Contractor's office shall be fitted with a telephone connected to the local Telephone Exchange.

1.10 The Contractor shall not use the site for any other purpose than that of carrying out this Contract work. The operations of the Contractor shall be confined to the area immediately adjoining the buildings and the works included in this Contract but site clearance shall be kept to the satisfaction of the Engineer to permit carrying out of other works by other Contractors. The Contractor shall not affix advertisements; neither shall he permit advertisements to be displayed without the written consent of the Engineer.

1.11 The contract drawings are the working drawings to guide the Contractor generally about the shape and size of all the structures and fittings. Before proceeding to make preparations, fabrication, execution, erection of any such fittings and other details of any temporary works, scaffolds, railings, shutterings, details of doors, windows, partitions, iron mongery works, etc; the Contractor shall be under obligation to prepare and submit all detailed shop drawings to the satisfaction and the approval of the Engineer, before doing any or all of that described above or as directed. Approval of the contractor’s drawings shall not relieve the Contractor for any part of his obligation to meet all the requirements of the specifications or correctness of his drawings.

1.12 No cement work shall be permitted during extreme cold weather when unless otherwise authorized by the engineer.

1.13 **PAYMENT**

Contractor shall not be entitled to any separate or additional payment on account of all these general requirements and any other arrangement or action Contractor has to undertake under the direction of the Engineer for a proper carrying out of the works and meeting all obligations of the Contract.

SECTION - 2

2.0 SITE CLEARING, GRUBBING AND SETTING OUT OF WORKS

2.01 SCOPE OF WORK

The work covered by this section of specifications consist of furnishing all labour, necessary equipment, services, miscellaneous and necessary items required to satisfactorily complete the clearing, grubbing and setting out of the works, as indicated on drawings, specified herein or both.

2.02 CLEARING

Clearing shall consist of cutting, or trimming of trees, if any, and the satisfactory disposal of tree and other vegetation designated for removal, together with the timber snags, bushes, and rubbish occurring within the area. Trees, other vegetation stumps, roots, and bushes in area to be cleared shall be cut off flush with or below the original ground surface except such individual trees, group of trees and vegetation as may be indicated on the drawing or designated by Engineer or his Representative to be left standing. Individual trees and other vegetation, to be left standing shall be thoroughly protected from damage during construction operation, by erection of barriers or by such other means as the circumstances require and as approved by the Engineer's Representative. Clearing operation shall be conducted in a manner that existing structures and installations under construction, employees and others remain safe.

2.03 GRUBBING

Grubbing shall consist of the removal and disposal of all stumps, roots and matted roots in the designated grubbing areas. Stumps, roots, logs and timber and other debris, shall be excavated and removed to a depth not less than 2 feet below any sub-grade level. In areas where the cut is over 3'-6" grubbing shall not be necessary.

2.04 DISPOSAL OF DEBRIS

Timber and other refuse to be disposed off by burning shall be burned at location, approved by the Engineer's Representative, in a manner that will avoid all hazard such as damage to existing structures, construction in progress, trees and vegetation. The contractor shall be responsible for compliance with all pertinent laws and regulations pertaining to the burning of fire. Disposal by burning shall be kept under constant attendance, and residual, until materials will not be permitted to be pushed or placed on the adjacent areas withought written approval of the owner/owners. The stones and concrete shall be broken and removed from the site for receiving the structure/flooring where required. All debris shall be disposed off by the Contractor as directed by the Engineer.

2.05 SETTING OUT OF WORKS

The Contractor shall set out the works and shall be responsible for true and perfect setting out of the same and for correctness of the direction, levels, dimension and alignment of all parts thereof. If at any time any error in this respect shall appear during the progress of the works, the Contractor shall, at his own expense, rectify the error to the satisfaction of the Engineer. The Contractor shall construct accurate benchmarks so that the lines and levels can easily be checked by the Engineer.

2.06 DRAINAGE DITCHES

The Contractor shall construct and maintain such ditches, in addition to those shown on drawings or as may be ordered by the Engineer to adequately drain and areas under construction.

2.07 PAYMENT

No separate payment will be made for the work covered under this section, and all costs in connection therewith shall be deemed to be included in the unit rates.

.

SECTION - 3

3.0 EXCAVATION, FILLING, BACKFILLING AND DISPOSAL

3.01 SCOPE OF WORK

The work covered by this section of the Specifications consists of furnishing all Plant, Labour Equipment Appliances and materials and in performing all operations in connection with excavating, filling, backfilling and disposal for building construction, and other foundations complete in strict accordance with this section of the Specifications and the applicable drawings and subject to the terms and conditions of the Contract.

3.02 BORING LOG DATA

A preliminary report on Sub-Soil investigation and exploratory data of the site area is available for reference only in the office of the Engineer. The Employer or Engineer's predications, regarding character or extent of soil or other sub-surface conditions to be encountered during the work are not binding on the Contractor. The Contractor shall make his own deductions for sub-surface conditions which may affect methods or cost of constructions of the work hereunder and he shall make no claim whatsoever for damages or compensation, should he find conditions during the progress of the work, different from those indicated by the soil investigation report of Engineer.

3.03 EXCAVATION

(a) Classification

Excavation shall include the removal of all materials of every category and nature. If rock is encountered it shall be removed carefully and without excessive noise and vibration. Blasting shall not be resorted to without specific permission in writing from the Engineer.

(b) The excavation shall conform to the dimensions and elevations as indicated on the Drawings. Foundations on made up ground shall be taken down to natural bottom soil as per direction and approval of the Engineer. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms installation of services and for inspection but the same shall not be paid.

(c) In the event of any excavations being carried out wider or deeper than authorized, the same shall be filled in by the Contractor at his own cost to the required levels with lean concrete if below footing or with properly compacted local river sand if beneath slabs or as directed by the Engineer.

(d) Shoring and Bracing:

The Contractor shall provide at his own cost, where required all shoring walls, supports etc. to the sides of the excavation to prevent sliding or any movement. Where necessary, excavated sides shall be sloped as directed by

the Engineer.

(e) Dewatering and Drainage:
The Contractor shall control the grading in the vicinity of site of work in order to prevent any water from running into the excavated areas. He shall at his own cost keep dry all pits and trenches during construction and all de-watering and pumping out whether due to ground water seepage or otherwise, shall be included in the rates as quoted by the Contractor. The method employed in all cases shall be approved and agreed by the Engineer or his Representative.

(f) Protection of utility lines:
When any existing utility lines whether to be retained or be removed are encountered within the area of operations, the Contactor shall notify the Engineer and his Representative, and shall not proceed until necessary measures are taken for protection or removal of the lines and instructions are obtained from the Engineer.

(g) Excess and undesirable material from excavation not required for fill or backfill of the building site, shall be disposed off, removed and/or deposited as for filling and leveled anywhere on the work site as directed by the Engineer. Earth suitable and meant for backfill shall be stored at site in a manner not to interfere with the progress of construction works.

3.04 FILL AND BACKFILL

Where concrete slabs are to be placed on the ground, any loam, organic and other unsuitable material shall be removed. Fill where required to raise the sub-grade for concrete slabs shall be clean, unadulated local river sand or gravel and shall be free from wood, stones and other debris. Excavated material shall only be used for fill if approved by the Engineer in writing. All the backfill behind the sub-grade walls shall be done with clean local river sand or approved excavated soil. Fill shall be compacted upto 95% modified AASHTO Density by a Power vibratory roller, mechanical rammer, or other approved equipment, in layers not more than 6 inch thick. Each layer shall be uniformly spread, watered to the extent of optimum moisture requirement for the required degree of compaction and then compacted. Contractor shall arrange at his own cost the testing of the filling where required by the Engineer or his Representative, after completion of foundation footings, walls, slabs and other construction below the elevation of the final grades and prior to backfilling. Backfill shall be placed in horizontal layers not more than 6 inches thick and shall have proper moisture content for the required degree of compaction of 95%. Each layer shall be compacted by mechanical tampers or by other suitable equipment approved by the Engineer. Backfill shall be brought to a suitable elevation above grade to provide for anticipated settlement and shrinkage thereof. Backfill shall not be placed against foundation walls etc., prior to the damp proofing treatment, if specified and approved by the Engineer or his Representative. Backfill shall be brought up evenly on each sidewall as far as practicable. Heavy equipment for spreading and compacting backfill shall not be operated closer to the wall than distance equal to the height of the backfill above the top of footing.

3.05 COMPACTION:

Fill and/or backfill within the building or structures and for a distance of 6 ft. outside structures shall be compacted to a density of not less than 95% maximum density at optimum moisture content.

3.06 **ROUGH GRADING:**

(a) Necessary rough grading shall be carried out by the Contractor to establish grade or construction requirements of the site. Grades not otherwise indicated shall be uniform levels or slopes between points on existing and finished grades. Abrupt changes in slopes shall be rounded. Additional fill required to complete rough grading shall be provided as directed by the Engineer or his Representative.

(b) Where paving or slabs are specified, all rough grading shall be done to the sub-grade of the base course, removing all large stones and debris and shall be compacted uniform to the correct lines and levels ready to receive the paving or slab. Refilling, where required shall be executed with suitable selected materials in layers not exceeding 6 inch thick and thoroughly compacted to the required density. In place density tests shall be carried out by the Contractor for the approval of the compaction by the Engineer.

3.07 **FOOTING BOTTOM LEVELS:**

The levels as noted in the Drawings are only approximate and must be adjusted in the field with the approval of Engineer, depending on the soil conditions encountered. No concreting shall begin until the soil bearing capacity is substantiated by visual inspection by the Engineer or his Representative. The Contractor in planning his work shall make arrangement and provisions to construct the lowest level footings first.

3.08 **FIELD LEVELS:**

Prior to starting the work, the Contractor shall arrange to take the levels of the piece of land on which the building is located as directed by the Engineer. The same shall be simultaneously checked by the Engineer or his Representative and shall form the basis of payments for excavation and filling etc.

3.09 **DISPOSAL OF SURPLUS EARTH AND RUBBISH:**

All surplus earth and rubbish shall be disposed off at site as directed by the Engineer. The term disposal shall include all operations of loading, unloading, stacking, spreading, rehandling, filling in depressions, including consolidating and ramming in layers not exceeding 6 inch thickness.

3.10 **MEASUREMENTS AND PAYMENTS:**

All excavation shall be measured net and perpendicular and no allowance shall be made for any increase in bulk of the excavated material after excavation or for sloping sides, or widened trenches to accommodate formwork, shoring and bracing etc. Similarly the measurements for filling/backfilling shall be thoroughly compacted and measured net and no allowance shall be made for any increase in bulk after excavation. Excavation, dewatering, filling and Disposal shall include all leads and lifts as specified elsewhere in these specifications. Payment for all the items under this section shall be made at the rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

Note:-

1. Imported earth fill item which will be paid separately as per the unit rate quoted in the Bill of Quantities. Appended to the contract and in accordance with applicable condition of the contract.
2. Stone soling item which will be paid separately as per the unit rate quoted in the Bill of Quantities. Appended to the contract and in accordance with

applicable condition of the contract.

3. Shoring / Close timbering and Dewatering items which will be paid separately as per the unit rate quoted in the Bill of Quantities. Appended to the contract and in accordance with applicable condition of the contract.

SECTION - 4

4.0 TERMITE CONTROL

4.01 SCOPE OF WORK:

The work covered by this section of Specification consists of furnishing all labour, materials, equipment, services, miscellaneous and necessary items required to complete Termite Control work, related works as indicated on drawings specified herein or both.

4.02 MATERIALS:

(a) Pesticides shall be solution of an approved chlorinated hydrocarbon such as O.5% Dieldrin or O.5% Aldrin mixed in clean water for application to or in earth, and mixed in pure turpentine for application to wood.

(b) Pesticides (dieldrin and aldrin) shall be obtained from the Government of Pakistan, Department of Agriculture, in sealed drums at rates in force at the time of their acquisition and only in the quantity necessary for work of this Project. All mixing shall be done at site and the amount of pesticides used shall be verified by the Engineer his Representative.

4.03 METHOD OF APPLICATION:

Pesticides solution shall be applied with approved pressure spraying equipment maintaining a pressure of IN/Sq.mm (15O lb/sq.in.) for all applications, to, on, or in earth. Spraying to wood shall be done by hand compassion sprayers with an approximate pressure of O.15 N/Sq.mm (2O lb/Sq.in).

4.04 EXTENT OF APPLICATION:

(a) At excavation, all walls and bottoms of all pits or trenches for footings or foundations are to be sprayed. Pesticide shall penetrate to a depth of 1'-O" minimum in porous earth at bottom and 3" minimum at sides of excavations.

(b) Stockpiled excavated material to be used as back fill is to be treated as above. After back-filling to plinth level, area of the whole building upto 1O'-O" outside the building line is again to be sprayed penetrating a minimum of 1 ft. into soil.

(c) After grading, compaction and sand filling before formation of hard core/soling under floor slabs all areas to be covered shall be sprayed with pesticides, penetrating a minimum of 1 ft. into soil.

(d) All rough woodwork for the entire project shall be pesticide treated (before application of so lignum in the case of material to receive both treatments).

Pesticide shall be sprayed on all surfaces of blocking, furring, planks, scantlings, boards etc. before installations. Spraying shall be once again done at the site, after delivery and before installation. All spraying will be done within one week of working of the material.

4.05 **LOCATION AND SCHEDULING:**

(a) Saturation of earth is to be done in such a manner as to in no way disrupt the progress of work.

(b) Spraying of rough woodwork shall be done on or near the site at location and in such enclosures as proposed by the Contractor and approved by the Engineer. Such work is to be scheduled and done by sufficient skilled personnel as to in no way impede the progress of the work.

(c) Care shall be exercised to ensure that no marks or damage occurs to the finished building as a result of the work under this Section, and Contractor shall verify and ensure that no material used herein will impede the growth of grass or plants at areas where spraying is done.

4.06 **STANDARD:**

All methods of termite protections used herein shall be in accordance with the standard practices of National Pest Control Association, U.S.A, and the British Wood Preserving Association.

4.07 **GUARANTEE:**

The Contractor is to guarantee that the building shall be free from termite (white ants), wood bores and other pests or rodents which cause damage to wood or other organic material for 1O years from the date of acceptance of the building.

In the event of any damage caused within the guarantee period, the Contractor shall replace at his own cost such damaged material finishes affected and suitably preserve and treat the entire premises with the best method known to the trade to prevent the spreading of termites and other pests.

4.08 **TESTING:**

All materials and samples shall be subjected to standard testing in accordance with the standards specified herein and shall be rejected if found below these standards. Rejected materials shall be removed from the site immediately.

4.09 **PAYMENT:**

Payment will be made for building site on the basis of plinth area covered by this treatment including all ditches, pits, excavation, fills etc. which will be paid separately as per the unit rate quoted in the Bill of Quantities.

SECTION - 5

5.0 WATER

5.01 SCOPE:

The work covered by this section of the Specification consists of furnishing all labour, appliances and in performing all operations in connection with obtaining, conveying and storing water at site of work.

5.02 QUALITY OF WATER:

The water used for construction shall be free from impurities and fit for drinking purpose.

5.03 TESTING:

Water if required, shall be subjected to standard testing at the cost of the Contractor and if found to be unsuitable for construction work then the Contractor shall take such action as directed by the Engineer.

5.04 PAYMENT:

No separate payment will be made for the work covered under this section, and all costs in connection therewith shall be deemed to be included in the unit rates.

5.05 TEMPORARY STORAGE TANK:

The Contractor shall provide on site at his own cost temporary storage water tank with all necessary G.I. Pipes and fittings as per instructions of the Engineer. No separate payment will be made for tank, pipes and accessories, etc. These tanks shall be removed or dismantled or demolished and the area shall be cleaned and made good on completion of work as per direction of Engineer.

SECTION - 6

6.0 CONCRETE

6.01 SCOPE OF WORK:

The work covered by this section of the Specifications consists of furnishing all plants, labour equipment appliances and materials and in performing all operations in connection wit concrete work complete in strict accordance with the applicable Drawings and the Specifications herein and subject to the terms and conditions of the Contract.

6.02 GENERAL:

Full cooperation shall be extended to other trades to install embeding items, and form ducts and openings etc. Embedded items shall have been inspected and check tested for concrete and other materials or for mechanical operations and approved before concrete is placed.

6.03 MATERIALS:

6.03.1 CEMENT

i) Grey/ white Portland Cement shall be normal setting cement of the specific gravity, fineness and chemical composition fully conforming to Pakistan Standard Specifications P.S. No.232:1967 and shall be capable of satisfying all tests such as the tensile strength tests contained therein. Standard test briquettes prepared with 1:3 cement sand mortar shall give the following tensile strengths:

At 3 days not less than 3OO Lbs/Sq.in(2.1N/Sq.mm).

At 7 days not less than 4OO Lbs/Sq.in (2.8N/Sq.mm).

ii) Sulphate Resistant Cement where required shall be sulphate Resistant Cement type 'A' fully conforming to Pakistan Standard Specification PS No.612:1967 and satisfying the requirements for fineness, chemical composition strength, setting time and soundness, etc.

iii) For all types of cements, described in sub-Clauses (i) and (ii) above, the average compressive strength of three concrete cubes shall not be less than 12OO Lbs/Sq.in(8.2 N/Sq.mm) at three days and not less than 2OOO Lbs/Sq.in(14 N/Sq.mm) at seven days as described in Ps.No.232.1962. Alternatively, the average compressive strength of three mortar cubes prepared with 1:3 cement and standard silica sand mortar shall not be less than 22OO Lbs/Sq.in(15.2 N/Sq.mm) at three days and not less than 34OO Lbs/Sq.in(23.5 N/Sq.mm) at seven days. The initial setting time shall not be less than 45 minutes and final setting time not more than 1O hours.

iv) The supply of cement must be so programmed by the Contractor that at no time the quantity of cement stock shall be less than that required for an average consumption of four weeks. Lorry or truck or other means of transportation, for the conveyance of cement to the site of works, shall be clean, dry, metalled lined and covered from top with water proof sheets, so that cement is sufficiently protected from any deterioration during transit.

v) The Contractor shall provide at his own cost, on the Site, all necessary sheds, which shall be perfectly dry and watertight for the storing of cement to be delivered to the works, to ensure adequate supplies being available at site of work.

vi) If at any time the Engineer or his Representative considers that any batch of cement may have deteriorated on the site during storage for any reason, he will direct that tests shall be made and that batch of cement on the site shall not be used until it has been shown by test at a laboratory, approved or appointed by the Engineer, to be satisfactory. Contractor shall bear all costs of such testing. Any rejected cement shall be removed from the site by the Contractor without delay. Cement reclaimed from cleaning bags or leaking containers shall not be used.

vii) Cement shall be consumed in the sequence of receipt of shipments unless otherwise directed by the Engineer or his Representative.

6.03.2 **AGGREGATES**

i) All fine and coarse aggregates to be used shall be supplied from approved sources, which shall not be changed without permission in writing from the Engineer. Aggregates shall conform to the test requirements of Pakistan Standard 243:1963 or equivalent.

ii) Fine aggregates, shall be approved sand and shall be clean, sharp, free from clay, earth, vegetable and organic matters, alkaline or acid reactions or other deleterious matter or impurities.

iii) Fine aggregates shall conform to Pakistan Standard Specifications PS No.243:1963 "Natural Aggregates for Concrete" and shall be graded as follows:-

B.S.SIEVE NUMBER.	PERCENTAGE (BY WEIGHT) PASSING	
	Grading Zone 1.	Grading Zone 2.
3/8"(9.5 mm)	100	100
3/16"(4.8 mm)	90 - 100	90 - 100
No. 7	60 - 95	75 - 100
No. 14	30 - 70	55 - 90
No. 25	15 - 34	35 - 59
No. 52	5 - 20	08 - 30
No.100	0- 10	00 – 10

iv) Coarse aggregates shall be approved hard crushed stone from a source approved by the Engineer and shall be clean, free from sand, dust, salt, lime, chalk, clay and organic impurities or other deleterious matter.

v) Coarse aggregates shall conform to the relevant Pakistan Standard Specifications PS No.243:1963 Coarse aggregate shall be graded as follows:-

FOR CONCRETE CLASSES A, B & C (Nominal Size of Graded Aggregate 3/4" to 3/16" (19 mm to 4.8 mm).

B.S.SIEVE NUMBER	PERCENTAGE (BY WEIGHT) PASSING
1" (25.4mm)	100
3/4" (19 mm)	090 - 100
3/8" (9.5mm)	020 - 55
3/16"(4.8mm)	000 - 10

FOR CONCRETE CLASSES D & E (Nominal Size of Graded Aggregate 1-1/2" to 3/16" (38 mm to 4.8 mm).

1 1/2" (38 mm)	100
1" (25.4 mm)	95 - 100
3/4" (19 mm)	35 - 70
3/8" (9.5mm)	10 - 33
3/16"(4.8mm)	0 - 5

vi) All aggregates shall be stored on properly constructed paving and in bins and there shall be a physical partition between the stockpiles of coarse and fine aggregate. No mixed up aggregates shall be used in any concrete. Under no circumstances aggregates shall be allowed to be in contact with ground.

vii) If required, aggregates shall be washed and screened to the satisfaction of the Engineer or his Representative before use by processing through proper screening and washing plant. Adequate time is to be allowed therefore, for the moisture content to become substantially uniform before use in works.

viii) Sieve analysis and other necessary tests of all aggregates shall be carried out as and when required by the Engineer or his Representative. Samples for such tests shall be taken in the presence of the Engineer or his Representative. All costs in connection with the tests shall be borne by the Contractor.

ix) All aggregates shall be subject to the approval of the Engineer. Any

batch of aggregates not found to the required standard shall be rejected by the Engineer or his Representative and shall have to be removed from site without delay. Concrete structures executed with rejected aggregates shall be dismantled and rebuilt at the Contractor's expense.

x) Special fine gravel of 9 mm (3/8") or 12 mm (1/2") maximum size shall be used if and where called for on the Drawings or as directed by the Engineer.

xi) If suitable gravel meeting with the Specifications is not procured by the Contractor, he will have to arrange suitable crush stone if demanded by the Engineer. No extra payment shall be made to the Contractor to effect this change.

6.03.3 WATER shall be as specified under section on water.

6.04 CLASSIFICATION OF CONCRETE:

Classes of concrete to be used in various parts of the works shall be as indicated on the drawings and mentioned in Bill of Quantities. The concrete of various grades shall be proportioned as set out in Table-I appended hereto.

TABLE-I: Showing minimum required compressive strengths 150 x 300 or 100 x 200 mm test cylinder and minimum quantity of cement required per cum or 100 cft. Of finished concrete for various mixes and under various conditions.

Class of Concrete	Nominal Min. Ratio	Min. Qty. of Cement		Preliminary Cylinder strength			
				at 7 days		at 28 days	
		Lbs. per 100 cft.	Kg. / Cu. m.	Lbs./ Sq. in.	N/ Sq.mm.	Lbs./ Sq. in.	N/ Sq.mm.
A.	1:1:2	3024	485	3350	23.10	4000	27.58
B.	1:11/2:3	2520	404	2800	19.31	3000	20.68
C.	1:2:4	2016	323	2250	15.51	2500	17.24
D.	1:3:6	1344	216	1100	7.58	1500	10.34
E.	1:4:8	1008	161	700	4.82	1000	5.86

6.05 PROPORTIONING OF CONCRETE MIXES:

6.05.1 All concrete shall be proportioned by volume for concrete mixes, unless specifically directed by Engineer to proportion them by weight, when the ratios will also differ. The proportions given above in Table-I are suitable only when the specific gravities of the aggregates are in the region of 2.5. The Contractor shall submit to the Engineer proposed mix designs for concrete to be used, based on preliminary laboratory tests to determine proportion of cement, aggregates and water in the concrete conforming to the quality and strength requirements specified herein. Preliminary test results of at least three different mixes of each class of concrete with varied water cement ratios shall be submitted. The results of 7 days and 28 days cube tests shall be used to establish the ratios between 7 days and 28 days strengths. The Engineer may make adjustments in the ratio of fine to coarse aggregate in the mix for a certain work. Preliminary design of mixes and testing shall be the responsibility of the Contractor. The proportion of voids in the coarse aggregate shall be controlled and if it exceeds 45% than sand and consequently the cement content shall be increased by the Contractor without any charge. If the proposition is less than 4O%, sand shall be decreased but not the cement.

6.05.2 **MAXIMUM ALLOWABLE WATER CONTENT:**

All concrete specimens shall be made, cured and tested in accordance with British Standard or ASTM Standard. A curve representing the relation between the water content and the average 28 days Compressive Strength or earlier strength at which the concrete is to receive its full working load shall be established for a range of values, including all the compressive strengths shown on the plans, The curve shall be established by at least four points each point representing average values for atlease four specimens. The maximum allowable water content for the concrete shall be as determined from this curve and shall correspond to a strength 15% greater than indicated on the plans. No substitution shall be made in the materials used in the work without additional tests in accordance with this procedure to indicate that the quality of the concrete is satisfactory.

6.05.3 **SLUMP TEST:**

The Slump for concrete, determined in accordance with PS No.422:1964 "Slump Test for Concrete" shall be minimum of 25 mm (1") and a maximum of 75 mm (3") provided the requisite strength is obtained. Corrective additions to remedy deficiencies in aggregate gradations shall be used only with the written approval of the Engineer. When such additions are permitted the materials shall be measured separately for each batch of concrete.

6.06 BATCHING AND MIXING:

6.06.1 Concrete shall be mixed by a mechanical batch type mixing plant with adequate facilities for accurate measurements and control of each material entering the mixer and for changing the proportions to conform to varying conditions of the work. The mixing plant assembly shall permit ready inspection of operations at all times. The plant and its location shall be subject to approval of the Engineer. However, if approved by the Engineer, Volumetric batching can be adopted, using cement by weight, at 20°C or 70°F according to the following table:

Class Mix.	Nominal	Cement Lbs.	Kg	Sand Cft.	Litre	Coarse Aggregate Cft.	Litre
A	1:1:2	110	50	1 3	35	2 2	70
B	1:1 1/2:3	110	50	1 3/4	50	3 2	106
C	1:2:4	110	50	2 2	70	5	140
D	1:3:6	110	50	3 2	106	7 2	212
E	1:4:8	110	50	5	140	10	280

Water shall be measured for every batch with due allowance made for water already present in aggregates.

6.06.2 **Batching** units where used shall be supplied with the following items:-

i) Weighing unit shall be provided for each type of material to indicate the scale load at convenient stages of the weighing operations. Weighing units shall be checked at times directed by and in the presence of the Engineer or his Representative and required adjustments shall be made before further use.

ii) Water mechanism shall be tight with the valve interlocked so that the discharge valve cannot be opened before the filling valve is fully closed and shall be fitted with graduated gauge.

iii) Discharge gate shall control the mix to produce a rib boning and mixing of cement with aggregates. Delivery of materials from the batching equipment to the mixer shall be accurate within the following limits:-

MATERIAL	PERCENTAGE BY WEIGHT
Cement	1/2
Water	1/4
Fine Aggregate	1
Coarse Aggregate	2

6.06.3 **MIXING UNIT:**

i) Operations:
Mixers shall not be charged in excess of noted capacity nor be operated in excess of noted speed. Excessive mixing requiring addition of water to preserve required consistency shall not be permitted. The entire batch shall be discharged before re-charging.

ii) Mixing time shall be measured from the instant water is introduced into the mixer drum containing all solids. All mixing water shall be introduced before one-fourth of the mixing time has elapsed. Mixing time for mixers of one cubic meter or less shall be 2 minutes; for larger than one cubic meter capacity

mixers time shall be increased 15 seconds for each additional half cubic meter or fraction thereof. If an air-entraining agent is used, additional mixing time shall be allowed such as to provide the specified air-content.

ii) Discharge Lock:
Unless waived by the Engineer device to lock the discharge mechanism, until the required mixing time has elapsed, shall be provided on each mixer.

iv) No hand mixing under any circumstances even with extra cement shall be permitted. If during concreting, the mixing plant fails, the concrete already poured shall be removed, unless directed otherwise by the Engineer or his Representative.

6.07 SAMPLES AND TESTING:

6.07.1 GENERAL:

Test cubes of concrete shall be prepared and stored by the Contractor, in accordance with PS No.56O:1965, as and when directed by the Engineer or his Representative. Test cubes be tested in a laboratory and the Contractor shall bear the charges for the same. Aggregates shall be tested as prescribed.

6.07.2 CEMENT:

Cement shall be tested as prescribed in Pakistan Standard or British Standard or ASTM Standard.

6.07.3 AGGREGATES:

Aggregates shall be tested as prescribed in relevant Pakistan Standard or British Standard 812. In addition fine aggregates shall be tested for organic impurities in conformity with B.S. 812 or equal ASTM Standard or Pakistan Standard.

6.07.4 REINFORCEMENT:

Reinforcing bars shall be tested as prescribed in relevant Pakistan or British or ASTM Standards. Mesh Reinforcement shall be tested as prescribed in B.S.785 or ASTM A-185.

6.07.5 TESTING OF CONCRETE

i) The Contractor shall provide for test purposes one set of six cubes taken for each class of concrete poured on each day. The Engineer or his Representative may, however, order for more cube tests if any irregularity is found in the concrete.

ii) All test cylinder shall be 100 x 200 or 150 x 300 mm size.

iii) All test cylinder of the same set shall be made from the same batch of concrete.

iv) Three cubes of the set shall be tested at 7-days and three shall be tested at

28 days or at such ages as directed by the Engineer or his Representative.

v) All test specimens shall be made and cured in accordance with Pakistan Standard PS 56O:1965 or British Standard B.S. 1881 or ASTM C-31.

vi) Specimens shall be cured under laboratory conditions except that the Engineer or his Representative may require curing under field conditions.

vii) All cube moulds shall be steel moulds perfectly true having all internal and the meeting faces machined to a smooth surface.

viii) If the strength tests of the laboratory controlled specimens for any portion of the work falls below the minimum allowable compressive strength at 28 days required for the class of concrete used in that portion, the Engineer or his Representative shall have the right to order replacement of the effected work.

ix) All test cubes cast at site shall bear distinguishing mark showing serial number, date of casting, quality of concrete and place from where sample was taken and where that batch of concrete was placed in the structure. A proper daily record of test specimens made, test results obtained shall be maintained by the Contractor and weekly test results shall be submitted to the Engineer or his Representative.

x) The Engineer or his Representative may require load tests for the part of the structure from where test specimens have shown unsatisfactory results at the cost of the Contractor. In the event that load tests indicate bad quality of concrete, measures as prescribed by the Engineer shall be taken to correct the deficiency at no additional cost to the Department. The nature, description and details of load test shall be determined by the Engineer and shall be binding on the Contractor.

6.08 TRANSPORTING AND PLACING CONCRETE:

a. Concrete shall be conveyed and deposited as quickly as possible after mixing and shall proceed so that, as far as possible, a complete section of the work is done in one operation.

b. Transport of concrete shall be in a manner approved by the Engineer's Representative and shall be so as to avoid segregation or loss of ingredients of concrete.

c. All foundations and portions of work to be concreted shall be approved by the Engineer's Representative before concrete is poured.

d. All forms and reinforcement shall be completed, cleared inspected and approved before pouring of concrete. No concrete is to be deposited till the Engineer's Representative has inspected and approved in writing all reinforcement, foundations, forms, details, positioning of all fixture and

materials to be embedded in concrete, control levels and screeds, etc. and is satisfied with the arrangements the Contractors has made to efficiently proceed with the work such as sufficient labour, materials, plants etc. Such an approval will not relieve the Contractor from any of his obligations under this Contract. Water shall be removed from excavations before concrete is deposited.

e. Placing of concrete shall not be permitted when, in the opinion of the Engineer's Representative, the sun heat, wind, cold, snow or limitations or facilities furnished by the Contractor prevent proper placing, finishing and curing of concrete.

f. All concrete shall be thoroughly compacted and consolidated by means of Pneumatic or mechanical vibrators or other approved compacting method. Care shall be taken to avoid segregation due o excessive vibration. The Contractor shall maintain on site at all times one or more stand-by vibrators. Tapping or other external vibration of forms shall not be allowed, unless so directed by the Engineer's Representative. Compaction shall be done until the whole mass assumes a jelly like appearance and consistency with the water just appearing on the surface. Concrete shall be sufficiently tamped and consolidated around the steel rods, care taken that the vibrator does not touch steel or formwork and into all parts of the moulds in order that no voids or cavities are left. Steel shall not be disturbed during operations of concreting. Concrete shall be brought up in even layers not more than 15O mm (6") thickness and worked against side of forms to give a smooth and uniform surface. No excessive water shall be allowed to come out and lie on the surface of concrete. The concrete must be of such a consistency that after ramming, consolidating and tamping is completed, a thin film of water is just appearing on the surface.

g. Hardened concrete, debris and foreign material shall be removed from interior of forms and from inner surface of mixing and conveying equipments.

h. Runways shall be provided for wheeled concrete handling equipment, and such equipment shall not be wheeled over reinforcement, nor shall runways be supported on reinforcement.

i. Concrete shall not be dropped freely from a height of more than 3.5 m (12 ft) in columns and 1.5 m (5 ft) elsewhere. Incases where an excessive drop is inevitable the Contractor shall provide spouts, down pipes, chutes, or side parts to forms with pockets which will let concrete stop and flow easily into the form without any risk of segregation. The discharge of the spouts, down pipes or chutes shall be controlled so that the concrete may be effectively compacted into horizontal layers not more than 300 mm (12") thick.

j. Concrete is to be deposited as quickly as possible after mixing and to proceed continuously. Concrete which has attained its initial set or has contained its mixing water for more than 3O minutes shall not be allowed to

be placed in the work.

k. When concrete is laid on hard core, such as subgrade for floor slabs, or other absorbent material, the surface is to be watered, consolidated and, where specified, blinded before the concrete is deposited.

l. Fresh concrete shall not be placed on previously laid concrete or on old concrete surfaces until the latter has been cleaned of dirt, scum and laitence by wire brushes. The clean surface shall then be thoroughly wetted and grouted with cement slurry as approved by the Engineer's Representative.

m. Care shall be taken not to disturb newly placed concrete by vibrator, indirect loading or otherwise. No traffic or loading shall be allowed on the concrete until it has thoroughly set and hardened.

n. Construction joints in concrete shall only be given at locations indicated on the drawings or as approved by the Engineer or his Representative. At the end of the day's work the concrete shall be finished off against a temporary shutter stop, which shall be vertical and securely fixed. Such stops shall be removed within 24 hours of placing of concrete. Construction joints not shown on the drawings shall be reinforced with steel bars or dowels, if deemed necessary by the Engineer or his Representative shall be furnished by the Contractor without any additional payment.

o. No concrete shall be placed during rains or in inclement weather and all fresh concrete shall be suitably protected from rain-fall and excessive heat or cold.

p. Should any part of the exposed surface present a rough uneven or imperfect appearance when the shuttering is removed It shall be picked out to honeycomb depth and refilled and properly re-surfaced or entirely redone as per directions of Engineer or his Representative at the cost of the Contractor.

q. On removal of the forms and before the skin has had time to harden, all faces of the concrete inside or outside, to be kept exposed shall be rubbed over with carborandum stone, and washed with cement to remove all marks, projections, hollows or any other defect. No extra payment shall be made for this work.

All exposed surfaces and lines of the concrete work are to be true and fair without cracks, bends, windings and distortions of all kinds, and if occuring, shall be removed without any extra charges by the Contractor. All un-plastered concrete works is to be fair face, smooth, pleasing and to the entire satisfaction of the Engineer or his Representative.

r. A float or screed is to be worked over the exposed surfaces of all concrete work on the flat or curve, so as to render the surfaces perfectly smooth, clear, and to the necessary slopes or falls or as required to receive the floor or roof finishes, according to the drawings, and as directed by the Engineer or his Representative without any extra charges by the Contractor.

6.09 **PROTECTION AND CURING:**

All exposed concrete shall be cured. Curing shall be accomplished by preventing

loss of moisture, rapid temperature change and mechanical injury or injury from rain or flowing water for a period of at least ten (10) days. Curing shall be started as soon as the concrete has hardened sufficiently for the surface not to be marked. Curing shall be done either by continuous sprinkling of water on the surface or by covering with sand, hessian, canvas or other approved fabric mats, which shall be kept continually wet. If required and so directed by the Engineer or his Representative, formed surfaces with forms in position shall also be cured by keeping all forms continually wet. As an alternative, curing of concrete, on all exposed surfaces which could not be kept covered, such as sides of the beams, under side of the slabs, may also be done by sealing concrete surfaces with curing compounds like "Paccacure" or equal so as to arrest loss of moisture from concrete, with approval of Engineer or his Representative. The Contractor shall take special care that curing of concrete is satisfactorily carried out and in accordance with methods specified herein and / or as instructed by the Engineer or his Representative. Any negligence in this regard may result in total rejection of such concrete works, which in the opinion of the Engineer or his Representative have not been adequately cured.

Minimum period of curing for any concrete shall be 10 days or more as directed by the Engineer. All concrete components of concreted structures shall be clearly marked with non-washable paints to indicate the date of placing concrete. During hot weather, curing shall be done even at night.

6.10 **FORMWORK:**

6.10.1 **General**

The formwork shall be inclusive of all labour, material, workmanship and alike. All form work and supports thereto shall be designed by the Contractor and relevant drawings shall be submitted to the Engineer and his Representative for approval before the work is put in hand. Such an approval shall not relieve the contractor from all the obligations of the contract or give rise to any claims.

6.10.2 **Making Forms**

The form-work for columns, beams, slabs lintels fins, shells, blocks, panels, purdees, surrounds for windows, and all other works whether to be precast or cast in situ shall be made of sound and properly seasoned timber or other approved material and shall be rigidly formed and designed by the Contractor to the shapes and forms as per drawings in accordance with the best of the existing practices so as to be able to withstand, without displacement, deflection or deformation movements of any kind, the pressure of the moist concrete and all other loads. For concrete work to show an even finish the timber forms be properly lined with plywood or steel sheets to give a fair face concrete of a homogenous, perfectly even and smooth appearance in exposed surfaces of all beams, columns, walls, slabs, etc.

6.10.3 **Rigid with Allowance for Camber and Bulges**

It shall be fabricated and erected in position, perfect in alignment, levels and true to plumb and shape and securely braced so as to enable it to stand all weights, live and vibrating to be endured during placing of concrete and its subsequent

hardening till the form work is struck. It shall be so sufficiently rigid as not to loose its form and shall be so made for bulging, and deflection as to give the finished concrete to the required lines, plumb, size and shape.

6.10.4 **Exposed Surfaces Left Unplastered**

For concrete work covered in this contract where concrete Surface is to be exposed in the finished work and left unplastered, the form-work shall be smoothly faced by using plywood sheets or lining the shuttering with smooth steel sheet or non-absorbent material like formica sheets or in any manner as approved by the Engineer or his Representative, so as to make a perfectly smooth surface of the finished concrete. Where any surface defects on the exposed concrete surfaces occur and which do not impair the structural performance, being in excess of the designed surfaces, and the architectural appearance of the work in the opinion of Engineer or his Representative, such defects may be removed by guniting and grinding with corborandum stone or in any other approved manner, at the cost of the Contractor, otherwise the whole or part of the work may have to be removed and remade good by the Contractor at his own cost. For precast concrete members the forms shall be rigid, exact, smooth and made of steel.

6.10.5 **Materials and Labour**

The Contractor shall supply all materials and labour, necessary for a good and speedily erection of form-work such as shuttering, planks, struts, bolts, stays, gangways, boards, fillets etc. and shall do all that is essential in executing the job in a workman like manner to the satisfaction of the Engineer.

6.10.6 **Form Work not to Interfere or Injure Work**

The form-work shall be so designed and arranged as not be unduly interfere with concrete, during its placing, and easy to be removed without injuring the finished concrete, wedges, clamps, bolts and the rods shall be used, when permitted and where practicable, in making the form work rigid and in holding it to true position.

6.10.7 **Opening in Form-work**

Wherever the Concreting is required to be carried out within forms of considerable depths, temporary openings in the side of the form shall be provided to facilitate the pouring and consolidation of the concrete. Small temporary openings shall be provided at the bottom of all forms to permit the removal of rubbish etc.

6.10.8 **Openings and other details**

Provision shall be kept in the form-work such as openings, recesses holes, pockets, fillets, etc for housing services and other architectural details in the finished concrete or on its surface and edges as shown on drawings or as directed by the Engineer or his Representative to fix all necessary inserts, dowels pipes, holdfasts etc. as shown on drawings or as directed.

6.10.9 **Joints in Form-work**

All joints in the formwork shall be sufficiently closed to prevent undue leakage of mortar for concrete surface not to be exposed in the finished work. The joints in the form-work for all concrete surfaces to be exposed in the finished work shall be close

jointed and perfectly smooth so as not to allow any leakage of the mortar from the concrete; and show any appearance of leaking mortar on concrete surface.

6.10.10 **Treatment and Inspection of Forms**

All rubbish, particularly chipping, shavings, and sawdust etc. shall be removed from the interior of the forms, immediately before fixing of bars. Forms shall be coated with approved mould oil before reinforcement is placed. Surplus oil on forms and any oil on reinforcing steel shall be removed. Forms surface not exposed to view or normal watering may thoroughly be wetted with soap and water in place of oiling before placing concrete. If the forms are not used within 24 hours, a fresh coat of oil shall be given before placing of concrete.

6.10.11 **Striking Shuttering**

No struts or timbering which serve the purpose of supporting the shuttering or centering shall be struck and removed without direct permission from the Engineer or his Authorized Representative in writing and the work of striking and removal after the receipt of such permission shall be conducted under the personal supervision of the competent foreman in the employment of the Contractor and the Contractor shall hold himself fully responsible for any consequences whatsoever. In all cases the Engineer or his Authorized Representative will direct and control the minimum period of time for which the forms, shuttering or centering shall remain in place before being struck; but, for the general guidance of the contractor, when normal Portland Cement has been used in the work, the following are to be considered as the minimum periods in days for the main classes of work:

Removal of Shuttering	10 °C (50°F)	20 °C (70°F)
Beams sides, walls & Columns (unloaded)	03	02
Slabs soffits (props left under)	09	06
Removal of props to slabs	18	14
Beams soffits (props left under)	18	12
Removal of props to beams, and shuttering Under shells.	24	18

The Engineer or his Representative may require, however, that any walings, soldiers, struts or other timbers or supports, the removal of which may cause the transference of load to the finished work, to be kept in place for three weeks after the placing of the concrete.

6.10.12 **Injury or Damage.**

The Contractor shall be responsible for any injury to the work and any consequential damages caused by or arising from the removal and striking of forms, centering and supports, due to striking too soon, and any advice, permission or approval given by the Engineer or his Authorized Representative, relative to the removal and striking of forms, centering and supports shall not relieve the Contractor from the

responsibilities herein defined.

6.10.13 **Treatment after Removal of Forms.**

Any minor surface honey-combing or other irregularities are to be properly made good immediately upon the removal of the form-work and the surface made good to the satisfaction of the Engineer and his Representative. Any small voids shall be neatly stopped with cement mortar consisting of one part of cement to two parts of sand and the whole surface rubbed over with corborandum stone and cement wash and bring the whole to a smooth and pleasing finish and uniform colour.

No form-work shall be measured and paid for separately and shall be deemed to be included in the unit price of concrete whether cast-in-situ or precast and subsequently fixed in position.

6.11 FINISHING OF FORMED SURFACES

6.11.1 SPECIAL ARCHITECTURAL FINISHES

i) Textured finishes - Textured form liners may be of form plastic sheet, wood sheet, metal, or other material. Liner panels shall be secured in forms by cementing or stapling, but not by methods which will permit impressions of nail heads, screw heads, washers, or the like to impart to the surface of the concrete. Edges of textured panels shall be sealed to each other or to divider strips (if specified or shown) to prevent bleeding of grout. The sealant used shall be non-staining to the surface.

ii) Aggregate transfer finishes - Aggregate transfer and other special finishes shall be produced using methods and materials in such a way as to duplicate sample panels prepared in advance.

iii) Applied finishes - When special finishes are to be applied, the surface of the concrete shall be prepared to ensure permanent adhesion of the finish. If the concrete is less than about 24 hours old, it can be roughened with a heavy wire brush or scoring mechanically or by etching with dilute hydrochloric acid. After roughening the surface shall be washed free of all dust, acid, chemical retarder, and other foreign material before the final finish applied.

6.11.2 RUBBED FINISHES

The following finishes shall be produced to concrete with a smooth form finish. Where smooth rubbed finish is to be applied, the forms shall have been removed and necessary patching completed as soon after placement as possible without jeopardizing the structures.

i) Smooth rubbed finish - Smooth rubbed finish shall be produced on newly hardened concrete not later than the day following from removal. Surfaces shall be wetted and rubbed with car texture are produced. No cement grout shall be used other than the cement paste drawn from the concrete itself by rubbing process.

ii) Grout cleaned finish - No cleaning operation shall be permitted until all

continuous surfaces to be cleaned are completed. Mix 1 part Portland cement cement and 1 1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paste. White Portland cement shall be substituted for a part of the grey Portland cement in order to produce color matching the color of the surrounding concrete, as determined by a trial patch. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or a spray gun. Immediately after applying the grout, scrub the surface vigorously with a cork flot or stone to the surface and fill all air bubbles and holes. While the grout is still plastic, remove all excess grout by working the surface with rubber float, sack, or other means. After the surface whitens from drying (about thirty minutes at normal temperatures), rub vigorously with clean burlap. The finish shall be kept damp for at least 36 hours after final rubbing.

iii) Cork floated finish - Remove from at an early stage, within 2 to 3 days of placement where possible. Remove ties. Remove all burrs and fins. Mix one part Portland cement and one part fine sand with sufficient water to produce a stiff mortar. Dampen wall surface. Apply mortar with firm rubber float or with trowel filling all surface voids. Compress mortar into voids using a slow - speed grinder or stone. if the mortar surface dries too rapidly to permit proper compaction and finishing, apply a small texture with a cork float using a swirling motion.

6.11.3 **UNSPECIFIED FINISH**

If the finish is not designated and applied finishes are also not indicated the following finishes shall be used as applicable:

i) Rough form finish - for all concrete surface not exposed to public view.
ii) Smooth form finish - for all concrete surfaces exposed to public view.

6.11.4 **RELATED UNFORMED SURFACE**

Tops of walls or buttresses, horizontal off-sets, and similar unformed surfaces occurring adjacent to formed surfaces shall be floated to a texture reasonably consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

6.12 **CONSTRUCTION JOINTS:**

Construction joints shall be located as indicated on the drawings and/or as approved or directed by the Engineer or his Representative. For slabs and beams construction joints shall be located at mid point of the span unless a secondary beam intersects a main beam at the centre in which case the joints in the main beam shall be off set a distance equal to twice the width of the beam and provision for shear shall be made by the use of inclined reinforcement at the cost of the Contractor. Joint in columns shall be made at the under side of the deepest beam framing thereto. Beam stems shall be poured monolithically unless directed otherwise by the Engineer. Joints not specified or shown on the drawings shall be so located as to least impair the strength and appearance of the work. Except where

indicated on the drawings no jointing shall be made in footings or foundations without written approval of the Engineer or his Representative. Construction jointing shall be at right angles to the member and shall be formed against firm stop boards. The stop boards shall be removed as soon as possible after placing the concrete but without the risk of movement of the concrete and the concrete surface shall be well brushed with a hard brush and washed off with a spray of water, two to four hours after casting, to expose the aggregates and provide a key for the next pour. In all liquid retaining structures and other sub-structures pits and trenches etc. PVC or any other approved water stops shall be provided at the construction joint in the manner shown on the drawings and/or approved by the Engineer or his Representative.

Whenever a section of concrete is left unfinished, for any reasons with the approval of Engineer's Representative, leaving a surface which will be hard set before additional concrete can be joined to it, dovetails, grooves or other bonds with the new work shall be provided at cost of the Contractor. Before depositing fresh concrete upon or against any concrete which has already set, the surface of the set concrete shall be roughened with a cutting tool, any laitance removed, thoroughly cleansed of all foreign matter, well watered and covered with cement grout, and special care shall be taken to ram the fresh concrete thoroughly up and against the set concrete; and, if deemed necessary by the Engineer or his Representative the joints shall be reinforced with steel bars or dowels to be all furnished and done by the Contractor without any additional payment.

6.13 CONCRETE FLOOR SLAB FINISHING:

6.13.1 GENERAL

Concrete slabs shall be finished as described herein. In preparation for finishing, floor slabs shall be struck off to the required level at or below the elevation or grade of the finished floors as shown on the drawings. Floors shall be leveled with a tolerance of 1 mm in 1 m (1/8" in 1O feet) except where drains occur in which case the floors shall be pitched to the drains as indicated on the drawings or as directed by the Engineer.

6.13.2 MONOLITHIC FINISH

All concrete surfaces in floors except where other finish is specified shall be finished by steel floats or straight edges to bring the surface to the required finish level shown on the drawings. While the concrete is still green but sufficiently hardened to bear a man's weight without deep imprint it shall be wood floated to a true even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood floats to bring moisture to the surface. The concrete shall then be hand toweled to produce a smooth impervious surface free from trowel marks. If necessary, the process shall be repeated so that the final finish shall produce a ringing sound from the trowel. No separate payment shall be made for finishing floor slabs in the fore mentioned manner.

6.13.3 CONCRETE TOPPING

Where indicated on the drawings base slab under concrete topping shall receive a screeded finish. After the base slab is thoroughly cured and when directed concrete

topping shall be laid to the thickness as indicated on the drawings in alternate panels of suitable sizes as directed by the Engineer or his Representative.

6.14 **ANCHOR BOLTS, INSERTS, SLEEVES, CHASES, RECESSES STEEL FRAMES ETC:**

The Contractor shall furnish and place in position accurately shown on drawings, all inserts, sleeves, chases, recesses, etc., supplied by himself or other Contractors, as directed, by the Engineer and full cooperation and co-ordination shall be maintained with other Contractors, sub-contractors in this regard.

6.15 **WATERPROOF CONCRETE:**

Wherever specified on the drawings all liquid or water retaining structures and those subject to water pressure shall be executed with approved waterproof concrete. The water proofing compound shall be of the approved type and shall be mixed with the concrete in strict accordance with the manufacturer's directions and/or as directed by the Engineer or his Representative.

6.16 **CLEANING AND REMOVAL OF RUBBISH:**

On completion of works herein the Contractor shall remove all concrete debris, rubbish, shuttering materials, scrapes etc., from the vicinity of the structures completed. All areas shall be cleaned to the satisfaction and approval of the Engineer or his Representative.

6.17 **COORDINATION:**

The Contractor shall provide chases and openings required for other sections of the work and will co-operate and coordinate with other trades in placing their pipes, ducts, reglets and other built-in-items as the work proceeds.

6.18 **EXTERNAL EXPOSED CONCRETE SURFACE:**

All external exposed un-plastered concrete surfaces of cast in situ or precast units shall be given smooth or pattern finish as shown in the finishing schedule or as directed by the Engineer or his Representative. No separate payment shall be made to the Contractor for this work and it shall be included in the item rates of the respective concrete items in the bill of quantities.

6.19 **PARTICULAR SPECIFICATIONS FOR CONCRETE**

a) Allowable bearing pressure of soil for foundation is marked on the drawing of the foundation. It is to be checked that no foundation is placed on the soil with a lower bearing capacity. In cases any weaker strata is encountered at any level the matter is to be reported to the Engineer for necessary changes in footings.

b) Level of foundations as indicated on the drawings may be varied at site to reach the suitable strata. This matter is to be decided by the Engineer at site.

c) Before concreting, the excavated surface to receive the concrete should be cut to proper levels. All loose soil is to be removed.

d) Minimum cylindrical strength requirements of various concrete mixes at 28 days actually being used for work using ordinary Portland cement shall be as

follows:-

Concrete Mix:	1:1:2	-	4000 p.s.i. (Class 'A')
	1:1 1/2:3	-	3000 p.s.i. (Class 'B')
	1:2:4	-	2500 p.s.i. (Class 'C')
	1:3:6	-	1500 p.s.i. (Class 'D')
	1:4:8	-	1000 p.s.i. (Class 'E')

e) All R.C.C. work shall be in 1:2:4 concrete mix unless otherwise indicated for a richer mix on the drawing or specified.

f) All concrete is to be thoroughly vibrated mechanically:

i. Any concrete failing to meet the specified strength or not formed as shown on drawings, concrete out of alignment, concrete with surfaces beyond require tolerances or with defective surfaces which cannot be properly repaired or patched in the opinion of Engineer=s Representative shall be removed and replaced at Contractor=s expense. The Engineer=s Representative may reject any defective concrete and order it to be cut out in part or in whole and replaced at the Contractors expense. Only in case of minor surface defects the Engineer's Representative may approve a surface treatment immediately after from removal.

ii. All ties and bolt holes and all repairable defective area shall be patched immediately after removal.

iii. All honeycombed and other defective concrete shall be remove down to sound concrete. The area to be patched and area at least 150 mm wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1 part cement to 1 part fine sand passing a No. 25 B.S. Sieve, shall be mixed to the consistency of thick cream and shall then be well brushed into the surface.

iv. The patching mixture shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and mortar shall consist of not more than 1 part cement to 22 parts sand by damp loose volume. White Portland cement shall be substituted for a part of the grey Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.

v. The quantity of mixing water shall be not more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until has reached the stiffest consistency that will permit placing.

vi. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to permit initial shrinkage, it shall be left undisturbed for at least 1 hour before being finally finished. The patched area shall be kept damp for 7 days. Metal tools shall not be used in finishing a patch in a formed wall, which will be exposed.

g) For heavy concrete members the form work is to be properly designed and approved by the Engineer.

h) Shuttering should not be struck earlier than the time specified unless otherwise approved by the Engineer.

i) 18 gauge G.I. binding wire to be used for securely binding the reinforcing bars to avoid dislocation or displacement during concreting.

j) Clear cover to main reinforcement in concrete members be as follows:-

i) For slabs, projections chajjas, fins, walls, staircases precast st slabs. 3/4"

ii) For beams, Columns, all members of water tank on the side in contact with water . 1 1/2"

iii) For foundations, retaining walls and foundation beams . 2"

k) All the reinforcing bars are to be properly placed as shown on the working drawings. Steel chairs and concrete spacer blocks are to be used without any extra cost. Concrete spacer blocks are to be properly cured to avoid their damage during concreting, thereby causing displacement of bars. Holes made by bolts etc. introduced for keeping the shuttering in tact should be properly treated after striking the shuttering. No such holes shall be allowed in walls of water retaining structures and earth retaining walls.

l) All bent up bars in slabs are to be properly secured in position. Workers or trollies shall not be allowed in any case over the reinforcement mesh.

m) Special care is to be taken to see that all expansion joints shown on the drawings are made in perfect straight line and treated as specified.

n) Construction joints in beams and slabs shall be located at the centre of the span (such that a proper seat is formed for the next part to be cast); unless otherwise indicated on drawings or approved by the Engineer.

o) DPC

The Concrete mix of DPC will be CC 1:2:4 as specified in this chapter.
To protect the dampness water proofing agent APudlo@ or any other water proofing agent as approved by the Engineer will be mixed in CC 1:2:4 @ the ratio of 5 lbs. per bag of cement. The DPC will be cured for at least 10 days.

6.20 MEASUREMENT AND PAYMENT

All the concrete work shall be measured net as per execution at site in square or cubic feet for the related items and shall be paid at the rate entered in the BOQ appended to the contract in accordance with the conditions of contract. The rates are inclusive of all type of form-work, its erection and removal, all scaffolding, cost of mixing and batching plants, all T&P required for executing and placing the concrete work in position etc. Defective and honey-combed work will not be measured & paid and will be liable to be rejected and redone at contracts' cost.

NOTE:

1. Bitumen coating item which will be paid separately as per the unit rate quoted in the Bill of Quantities. Appended to the contract and in accordance with applicable condition of the contract.
2. PVC water stopper bar item which will be paid separately as per the unit rate quoted in the Bill of Quantities. Appended to the contract and in accordance with applicable condition of the contract.

SECTION - 7

7.0 STEEL REINFORCEMENT

7.01 SCOPE OF WORK:

The work covered by the section of the specification consists of furnishing all materials, tools, labour and in performing all operations in connection with the providing, straightening cutting, bending, binding, fixing, including binding wire, chairs, pins, spacer block complete in strict accordance with this section of the Specifications, the applicable drawings, approved bar bending schedule, and the terms and conditions of the Contract.

7.02 MATERIALS:

A. Reinforcing steel to be new billet stock of mild steel (plain bar), hard grade (deformed bar) and Ribbed Tor steel as specified on the drawings and shall conform to British Standard Specifications or equivalent ASTM or Pakistan Standard.

B. The Contractor shall furnish to the Engineer's Representative Manufacturers' mills certificate to guarantee that steel meets the standard, specifications requirements and minimum certified yield stresses as follows:-

i) Mild Steel plain bars conforming to B.S.S. 15 or B.S.S. 4449 or PS-231-1962

a) Tensile Strength - 438 to 517 N/Sq.mm (28 to 33 tons/Sq.in).
b) Yield Strength - 250 N/Sq.mm (16 Tons/Sq.in)
c) Elongation - 16% to 24% (av. 20%).

ii) Hard grade deformed bars conforming to ASTM, A-615

a) Tensile Strength - 560N/Sq.mm (35.7 Tons/Sq.in).
b) Yield Strength - 420 N/Sq.mm (60,000 psi).
c) Elongation - 11 %

Tensile Strength

iii) Ribbed Tor steel conforming to B.S. 4461

a) Tensile Strength - 490 N/Sq.mm(70,000 Lbs./Sq.in).
b) Yield Strength - 420 N/Sq.mm (60,000 Lbs./Sq.in).
c) Elongation - 14.5%

C. All steel to be true to the Standard Specifications with regard to bend ability specially the hard grade deformed bars under 19 mm (3/4") dia. shall be capable of being bent cold through 9O degree round a bar of four times its own diameter without fractures or injury of any kind. In case of deformed bars over 19 mm (3/4") dia. and under 28 mm (1-1/8") dia. round a bar of 6 times its

own diameter.

D. 18 gauge galvanized wire shall be used for binding the steel reinforcement.

7.03 **TESTING:**

Reinforcement shall be obtained only from manufacturers approved by the Engineer=s Representative.

If and when required samples shall be tested for above specification in an approved laboratory when required by the Engineer or his Representative and all costs of such tests shall be borne by the Contractor.

7.04 **STORAGE**

Reinforcing bars shall be stored on platforms above surface of ground and be free from scales, oil, structural defects prior to placement in works. Rusted or dirty steel bars shall not be used in the works unless brushed and cleaned by proper steel wire brushes and after being approved for use by the Engineer or his Representative.

7.05 **REINFORCEMENT CUTTING AND PLACING**

A. All reinforcement steel shall be cut and bent cold in strict accordance with bar bending schedules approved and drawings supplied by Engineer. The Contractor shall prepare bar bending schedule from approved structural working drawings and instructions to be provided to him by the Engineer. The bending schedules shall be drawn on approved forms and submitted to the Engineer or his Representative for checking and approval. The steel reinforcement shall be cut and bent to sizes as per drawings and approved bending schedules. In case any bars, cut, bent or even fixed in position are found incorrect in dimensions size or shape according to the requirements of the drawings and instructions of Engineer, the Contractor shall replace such steel bars cut bent or fixed in position by correct sized bars at his own cost and no extra payment shall be made to the Contractor on such account. The system of holding bars in place shall ensure that all steel in top section will support weight of workmen without displacement or distortion. Suitable spacers and chairs as approved by the Engineer or his Representative shall be used for supporting and spacing purposes of bars. In case any bars are bent or displaced they shall be straightened or replaced prior to pouring. All reinforcement bars within the limit of a days pour shall be in place and firmly tied with 18 gauge G.I. wires. Bars with kinks or bends not shown on drawings shall not be used.

B. Where indicated in the drawings, mesh shall be of the sizes as shown on drawings and conform to British Standard B.S.785. Mesh reinforcement when used in slabs shall be supported at proper elevations by standard accessories. In slabs on ground, pre cast concrete blocks may be substituted for chairs.

7.06 **LAPS AND SPLICES**

A. No splicing of bars shall be allowed at position other than shown on the

drawings. All lap lengths shall be of the minimum sizes as indicated on the drawings and in no case shall lap length be less than 4O times the diameter of the bigger lapping bars for nominal M.S. bars. Hard grade bars and tor steel shall have laps of 5O time the bigger diameter of lapping bars. Splices of adjacent bars shall be staggered unless approved otherwise by the Engineer or his Representative.

B. All reinforcing steel fixed in position shall be inspected by the Engineers Representative and no concrete shall be poured until steel placement has been approved by the Engineers Representative. For inspection purposes the Contractor shall give to the Engineers Representative reasonable notice before the scheduled pouring time. Clear concrete cover to reinforcement steel shall be as indicated on the drawings/specified.

7.07 MEASUREMENT AND PAYMENT

A. The quantity to be paid for shall be the calculated in theoretical number of metric ton of reinforcement steel bars or mesh as determined from the approved bar bending diagrams and incorporated in the concrete and accepted, except when reinforcement is paid for under other items.

B. The weight of plain or deformed bars will be computed from the theoretical weight of plain round bars of the same nominal size as shown in the following tabulation:

Size in.	Weight in lbs per ft.	Size in.	Weight in lbs per ft.
1/4	0.167	3/4	1.502
3/8	0.376	7/8	2.044
1/2	0.668	1	2.670
5/8	1.043	1 1/8	3.380

C. Clips, ties, separators, and other material used for positioning and fastening the reinforcement in place, and structural steel, shall not be included in the weight calculated for payment under this item. If bars are substituted upon the Contractor's request and as a result more steel is used than specified only the amount specified shall be included.

D. When laps are made for splices, other than those shown on the drawings or required by the Engineer and for the convenience of the Contractor, the extra steel shall not be measured nor paid for.

E. When continuous bars are shown on the drawings, without the splices being shown, the necessary steel in the splices will be paid for on the basis of the individual bars not being shorter than 4O ft.

F. The accepted quantity measured as provided above shall be paid for at the

contract unit price for the items listed in the Bill of Quantities which price and payment shall be full compensation for furnishing materials, labour, equipment and incidentals necessary to complete the item.

SECTION – 8

8.0 DISMANTLING AND DEMOLITION

8.1 SCOPE OF WORK

The scope of work of this section covers dismantling and demolishing of existing works.

8.2 EXECUTION

The existing work as may be required shall be dismantled. Where a portion of the RCC work is to be demolished, the reinforcing steel bars shall be cut carefully where required or cleaned straightened and restored in position. Dismantling shall be carried out with appropriate tools and in such a manner as to avoid unnecessary damage or injury to other adjoining work and to those parts of works which are to be retained and to render unserviceable as little of the material as possible. Any un-necessary damage shall be made good by the Contractor at his own expense.

Where insulation, roof coverings and waterproofing etc. are required to be removed from the roofs, roofs shall be thoroughly cleaned to bare concrete.

Where footings and foundations are required to be removed, the work shall also include excavation, backfill with excavated suitable material and compaction to 95% standard Proctor density.

The unserviceable material and debris shall be disposed off outside the Site limits to the satisfaction of the Engineer and the local authorities, or to a place within the Site, as may be designated in the Contract.

All serviceable materials shall be separated, cleaned and properly stacked within the Site.

All salvaged serviceable materials shall be handed over to the Employer unless provided otherwise in the Bill of Quantities.

8.3 MEASUREMENT

The unit of measurement shall be as indicated in Bill of Quantities. All quantities shall be measured net. In case of demolition of structure, plaster and paint shall not be measured for separate payment.

SECTION – 9

9.0 STRUCTURAL STEEL WORKS

9.1 SCOPE

This Section covers requirements of steels, steel work, fabrication, methods including precautions for erection of steel structures and other general requirements incidental to steel work.

9.2 GENERAL

The applicable requirements of this section as determined by the Engineer shall apply to all structural steel works under this contract. The work covered by this Section consists of all material, labour, plant, equipment and appliances including welding, bolts, nuts, washers, anchor bolts, embedded parts etc. fabrication and erection in accordance with the specifications and as per drawings and as directed by the Engineer.

9.3 DRAWINGS

9.3.1 Design and Working Drawings

These shall be prepared by the Engineer and supplied to the Contractor. These shall contain main dimensions, sizes of member & typical details of joints, list of material etc.

9.3.2 Workshop Drawings

a) Before proceeding with the manufacture, or fabrication, Workshop drawings shall be prepared by the Contractor from the working drawings supplied, taking into consideration the following instructions:

- Fabrication in convenient sub-assemblies and each shop assembly to be given an erection mark.
- Milling (machining of bases of supporting plate) for erection without adjustments.
- Provision of basic elements for/with erection devices.
- Keeping with the requirements of computed strength of all connections and joints of structures not foreseen in the design and working drawings.
- Other requirements having an influence on the technology of fabrication transportation and erection of steel structures.

- Uniformity of elements and parts of the steel structures should be maintained for mass fabrication.

b) Workshop drawings shall consist of two parts:

1. An erection scheme having the following information:

   - o Location of erection element in respect of these elements with each other or with the existing steel or reinforced concrete structures.
   - o Erection joints showing erection welding thickness and lengths, bolts or rivet diameter and numbers.
   - o Chart showing list of assembling marks having columns such as Mark, Description, Quantity, and Weight of each Mark, Total weight and Remarks with grand total in the end.
   - o Chart showing list of Erection Bolts, Nuts and Washer having columns such as size, quantity, weight and notes with grand total.
   - o The mark for shop assemblies of each erection scheme shall have a different index for example scheme of trusses purlins etc. shall have Marks A1, A2, A3, onwards and another scheme of columns beams etc. shall have Marks B1, B2, B3 and onwards. While marking on the plans, elevations, sections and details the index shall be omitted.
   - o The recommended scale of erection scheme is 1:5O, 1:100, 1:200, for joints 1:5, 1:1O or 1:2O.
   - o Except in special cases all scheme drawings shall be made in single fairly thick lines.
   - o Erection Scheme shall contain the following notes:
     - i) Erection shall be done using the erection welding and bolts of normal sizes and accuracy according to the joints of the scheme.
     - ii) Quality and type of electrode.
     - iii) Measures against unscrewing of bolts.
     - iv) Erection shall be carried out according to the standard for fabrication and erection of steel structures.
     - v) Painting instructions.
     - vi) References to design and working drawings.

2. A shop assembly drawing containing the following information:

   - o Each Shop Assembly (Mark) shall be drawn separately showing necessary lines, elevation sections with reference to axis, centre lines, location of holes, cleats, plates lugs etc. .fully dimensioned with part numbers.

- Bolts, holes and symbols.

- Geometrical Setting out dimensions necessary for the assembly of an element. Location and details of joints as calculated by the Fabricators / Engineer.

- Instruction for welding, dimensions of weld (Seams) processing of edges, methods of welding, quality of welded material, length of welds on every element, requirements for welding and method of their control. Specification for Electrode selected according to specification of steel.

- Standards and quality of steel used.

- Parts List.

- Instruction for painting, primer and finish coats with derusting process.

- Recommended scale for assembly drawings are preferably 1:1O or 1:2O and for joints and details 1:1, 1:2 or 1:5.

- Notes for assembly drawings shall be as follows:
  i) List of symbols for bolts and holes used.
  ii) List of symbols for welds used.
  iii) Edge distance (general).
  iv) Welding thickness (general).
  v) Material quality of steel used.
  vi) Type and quality of electrodes to be used.
  vii) Test for welding if any.
  viii) Reference to related erection scheme drawings.
  ix) Reference to design and working drawings.

9.4 MATERIAL

Except otherwise required or stated in the drawings the materials specifications shall conform to the following. Wherever necessary Contractor may use equivalent British Standard or other alternative material subject to approval of the Engineer. Material shall generally conform to the applicable requirement of ASTM A-6.

a) Structural Steel

- Structural steel for structures not requiring Welding shall conform to the requirements of ASTM A-7-66 (for bridges and buildings) or ASTM A-36-77.

- Structural steel for structures requiring welding shall conform to the requirements of ASTM A-36-77 or approved equivalent.

b) Sheet Steel

Sheet steel for structures where no welding is required shall conform to the requirement of ASTM A-366-62T (for Cold Rolled Carbon Steel Sheets commercial quality) or ASTM A-415-64 (Standard specifications for Hot Rolled Carbon Steel Sheets, commercial quality). For structures where welding is required sheet steel shall conform to the requirements of ASTM A-415-64 and steel plate to ASTM A-283-79 (Low and intermediate strength carbon steel plate) or A-514-77 (High-yield-strength, quenched and tempered alloy steel plate, suitable for welding as required.

c) Filler Metal for Welding

Welding Electrodes for manual shielded metal arc welding shall conform to the specifications for mild steel covered Arc-welding Electrodes, AWS A 5.5 (latest edition). Equivalent locally manufactured electrodes by Pakistan Oxygen may also be used subject to the approval of the Engineer.

d) Ordinary Bolts, Nuts and Washers

Bolts and nuts shall conform to the requirements of ASTM A-3O7-65 (Standard specification for low-alloy, carbon steel, externally and internally threaded, standard fasteners). Bolts shall be of Grade A for general application with square or hexagon heads as specified in the drawings. Turned bolts shall also conform to the requirements of ASTM A-3O7-65, except that the tolerance of the unthreaded portion of the bolt body shall be +O.O - O.15 mm of the diameter.

e) Cut Washers

Shall be of structural grade steel and shall conform to the dimension of the manufacturer's regular standard for plain washers for the size and type of bolts used.

f) Cast Iron

Shall conform to the requirements of ASTM A-48-64 (Standard specifications for Grey Iron Castings) or equivalent.

g) Iron Pipe

Where iron pipe is called for, it shall be genuine wrought iron fully galvanized. All Threads to be cleaned and coated with rust resistant coating.

h) Painting Materials

Paintings materials which include emulsions, epoxy based enamel paints, sealers, primers, wax, varnishes etc., shall be standard best or top brands produced for each particular kind of material required.

9.5 ALLOWABLE STRESSES

a) Allowable stresses for steel shall be considered tabulated in Appendix A of specifications for the Design, fabrication and erection of structural steel for buildings; Part 5 of the Manual of Steel Construction published by the American Institute of Steel Construction.

b) Allowable stresses for rivets, bolts and threaded parts as per table 1.5.2.1 of AISC specifications.

c) Allowable stresses for welds as per table 1.5.3 of AISC specifications.

9.6 FABRICATION

a Straightening Material

Rolled material, before being worked upon, must be straightened within tolerances by ASTM specifications A6. Straightening, necessarily shall be done by mechanical means or by the application of limited amount of localised heat. The temperature of heated areas, as measured by approved methods, shall not exceed 1100 F for A514 steel or 1200 F for other steels. All material, before and after fabrication shall be straight or curvilinear form as required free from twists.

b) Cutting

As far as possible cutting must be done by shearing. Oxygen cutting shall be done where shear cutting is not possible and shall preferably be done by machine. All edges shall be free from gauges, notches or burs.If necessary the same shall be removed by grinding.

c) Holes punching drilling

Holes shall be punched where thickness of the material is not greater than the diameter of bolt or rivet + 3mm. Where the thickness of the material is greater, the holes shall be drilled or sub-punched and the drill of all sub drilled holes shall be at least 2mm smaller than the nominal diameter of the rivet of bolt. Holes for A514-77 steel plates over 1/2" thick shall be drilled. Holes shall not be allowed to formed gas cutting process.

d) Welding

1. Maximum Thickness of fillet welds

   i) Not more than 1.2 times the lesser thickness of materials being welded.

   ii) At welding of rolled profiles along edges, which are curved, not more than the thickness of the edge minus the radius of the curve.

2. Minimum thickness of fillet welds.
   Least thickness for calculation and designing requirements:

Thickness of thicker part	Up to 10 mm	11mm to 20mm	20mm to 30mm	31mm to 50mm	Above 50mm
Thickness of Weld for carbon steel.	4	6	8	10	12
Thickness of Weld for low alloy steel	6	8	10	12	-

3. Design length of a fillet weld shall not be less the 40 mm or 10 times thickness of fillet weld and not more than 60 times thickness of fillet weld.

4. Surfaces to be welded shall be free from loose scale, slag, rust, grease, paint or any other foreign matter except mill scale which withstands vigorous wire brushing.

e) Tolerances

1. A variation of 1 mm is permissible in the overall length of members with both ends finished for contact bearing. The bearing surface is to be prepared to common plane by milling.
2. Members without end finished for contact bearing which are to be framed to other steel parts of the structure shall have a variation from detailed length not greater than 3mm.

f) Each piece of steel work after fabrication shall be distinctly marked before delivery to site in accordance with a marking plan for erection assembly.

9.7 SURFACE PREPARATION

a) All steel work shall be cleaned free from loose scale, rust, dust, slag etc. by using suitable means. Sand blasting shall be carried out wherever so specified by the Engineer.

b) Steel work to be encased in concrete or surfaces in contact with concrete or grout shall be given a cement wash.

c) Machine finished surfaces shall be coated with rust preventive compound approved by the Engineer prior to removal from shop and immediately after finishing. Such surfaces shall be protected with wooden pad or other suitable means for transportation. Unassembled pins and bolts shall be oiled and wrapped with moisture resistant paper.

d) All other surfaces of steel work shall be painted as specified hereunder.

- Resin based special emulsion paint shall be manufactured by one of Pakistan paint manufacturers, as approved by the Engineer. The paint shall be composed of P.V.A. with pigment of Titanium dioxide with inert extenders, having viscosity of 70-75 K.U. at 25 deg. C and approximate specific gravity of 1.33. The paint shall have flat finish, smooth and free from brush marks and resistant to fungus growth.

- Enamel paint and primers shall be Dulux as manufactured by M/S Imperial Chemical Industries Pakistan Ltd. or approved equal and shall be applied in accordance with the period instructions of the manufacturers.

No separate payment shall be made for painting of structural steel works. The Contractor shall include all the cost of labour, plant and material for this work in the price as mentioned in the Bill of Quantities.

9.8 ZINC COATING (GALVANIZING)

Where ever specified by the Engineer zinc coating shall be applied in a manner and or a thickness and quality conforming to the requirements of ASTM A-123-65,

standard specifications for zinc (Hot galvanized) coating on products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strips.

9.9 INSPECTION AND TESTS

a) Manufacturer's Works Test certificate for all material used shall be furnished by the contractor for Engineer's scrutiny and approval. The contractor shall provide all necessary facilities to Engineer for inspection of steel structure work during fabrication and erection.

b) Rolling tolerance of all shapes and profile according to AISC (American Institute of Steel Construction) shall be in accordance with the provisions of the American Society for Testing and Materials Designation A.6 These shall be checked by the Contractor before being worked upon and shall be rejected if found not within limits.

c) The Contractor shall arrange for analysis and test of all material rolled locally at a testing laboratory selected by the Engineer, for which Contractor will bear all expenses.

d) Nevertheless neither the fact that the materials have been tested nor that the manufacturers works test certificates have been furnished shall effect the liberty of the Engineer to reject after delivery, material found not according to these specifications.

e) The inspection of welding shall be performed in accordance with the provisions of Section 6 of the code for Welding in Building Construction, DI. O-69 of the American Welding Society ("Structural Welding Code" AWS DI-1)

f) Materials or workmanship not in reasonable conformance with the provisions of these specifications shall be rejected at any time during the progress of the work or the completion and erection at site.

9.10 ERECTION

a) Bracing.
The frame of steel skeleton buildings shall be carried up true and plumb within the limits defined in section 7(h) of the AISC code of standard practice, and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected including the equipment and the operation of the same. Such bracing shall be left in place as long as required for safety. Wherever piles of material, erection equipment and other loads are carried during erection, proper provision shall be made by the contractor to take care of the stresses resulting from such loads.

b) Alignment & Bolting.
No riveting, permanent bolting or welding shall be done at site during erection until as much of the structure as will be stiffened thereby has been properly aligned. The threaded portion of each bolt shall project through the nut at least one thread.

c) Painting after Erection.

Before painting of steel which is delivered unpainted is commenced, all surfaces to be painted shall be dry and thoroughly cleaned from all loose scale and rust. The specified protective treatment shall be completed after erection.

9.11 MEASUREMENT & PAYMENT

a) General

i) The cost of all the works involved within the scope of this specifications as per all the drawings and conditions of contract are covered only within the quoted rate of items of the Bill of Quantities.

ii) Unless otherwise specified and to the extent provided in the Bill of Quantities no separate or additional payment will be made for the following works, the cost of which shall be deemed to have been included in the quoted rate of the Bill of Quantities item.

- Providing nuts, bolts, screw, rivets, heads, filets welds and welding rods.
- Galvanizing and prime coating steel work.
- Painting Steel Work.
- All embedded parts other than steel.

b) Measurement

i) Items of work of structural steel for which the unit rates have been quoted on weight basis shall be measured net as acceptably supplied and installed at site as per drawings / workshop drawings and as per instruction of the Engineer. After measurement the theoretical weights shall be calculated from standard tables of section and weights in the manner followed in the preparation of workshop drawings. The cost of loading and unloading, transportation and handling of structural steel items shall be deemed to be included in the quoted unit rate of the related Bill of Quantities item.

ii) Measurement of acceptably completed installation and erection works of Structural steel items supplied free of cost by the Employer will be made on the basis of number of tons of structural steel items erected and installed in position as shown on the drawings or as directed by the Engineer. The cost of loading and unloading, transportation and handling of structural steel items shall be deemed to be included in the quoted unit rate of the related Bill of Quantities item.

c) Payment

Payment will be made for acceptable measured quantity of structural steel works on the basis of unit rate quoted in the Bill of Quantities and shall constitute full compensation for all the incidental works related to the item.

TECHNICAL SPECIFICATIONS – AIR CONDITIONING & MECHANICAL VENTILATION WORKS

1.0 GENERAL:

The contract drawings indicate the extent and general arrangement of the Air Conditioning and Mechanical Ventilation System. Equipment's, ducting and piping shall fit into the space allotted and shall allow adequate and acceptable clearance for entry, servicing and maintenance. Where component parts of equipment or system cannot be serviced without distributing adjacent work resulting from original installation of other work, corrective action satisfactory to the Client / Project Managers / Consultant shall be taken, without any additional cost to the Owner.

(a) Capacities of equipment and materials shall not be less then those indicated.

(b) Conformance with Agency requirements: Where materials or equipment are specified to conform to requirements of Underwriter's laboratory, Inc., Air-conditioning and Refrigeration Institute of Heating, Refrigeration and Air-conditioning Engineers, etc., the Contractor shall submit proof of conformance. The label or listing of the specified agency will be acceptable evidence.

(c) Nameplates: Each major item of equipment shall have the manufacturer's name, address serial and model numbers on a plate securely attached to the item.

(d) Protective and Access requirements: Belts, pulleys, chains, gears, coupling, projecting set-screws, keys and other rotating parts are so located that any person in close proximity shall be fully enclosed or properly guarded. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified by the manufacturer. Items such as catwalk ladders and quadrails shall be provided where indicated for safe operation and maintenance of equipment.

(e) Verification of dimensions: The Contractor shall visit the premises to thoroughly familiarize himself with all details of the work and working conditions and verify all dimensions in the field, and shall advise the Client / Project Managers / Consultant of any discrepancy before performing any work. The Contractor shall be specifically responsible for the co-ordination and proper relation of his work to the building structure and to the work of all trades.

(f) Cost of wooden frame: The cost of termite treated deodar wood

frame equal to size of opening shall be deemed to have been included in the relevant items.

(g) Pipes crossing fire rated wall, the gap between wall and pipes shall be filled with soft packing like mineral wool, the ends shall be closed with approved sealant shall be deemed to have been included in the relevant items.

1.1 Equipment and Material:

(a) General:

These shall conform to the respective publications and other requirements specified herein, and as shown on the drawings and shall be the products of the manufacturers regularly engaged in the manufacture of such products. Items of equipment shall essentially be duplicate of equipment that has been in satisfactory use at least 10 years prior to bid opening and shall be supported by a service organization that is, in the opinion of the Client / Project Managers / Consultant, reasonably convenient to the site. It shall be solely the Contractor's responsibility to ensure that the equipment / material supplied by him shall fit into the space allotted for the purpose. If at any stage it is detected that the equipment supplied by him cannot fit into the space provided for the equipment, then the Contractor shall be responsible for supplying other equipment of suitable size, without incurring any additional cost to the Owner.

(b) Approval of Equipment and Material:

Before starting installation of any material or equipment, the Contractor shall submit for approval, working drawings of all areas and lists of materials and equipments to be incorporated in the work. The layout drawings shall include a plan and elevations of the proposed work, piping and equipment to establish that the equipment will fit in the allotted space with clearances for installation and maintenance. The drawings shall show proposed details for attachment anchoring, and hanging to structural framing of the building; vibration isolation units; foundation and support; location and size of sleeves and prepared openings for passage of pipes. If departures from the contract drawings are deemed necessary by the Contractor, details of such departures including changes in related portions of the project and the reasons thereof shall be submitted with the drawings. Approved departures shall be made at no additional cost to the Owner. A complete electrical connection diagram, for each electrically controlled component having automatic or manual control device, shall be submitted for approval. Wiring diagrams shall identify each component and one diagram shall show all interconnected or interlocked components. The lists of materials and equipment shall be supported by sufficient descriptive

material, such as catalogs, diagrams, performance curves, charts, Layout drawings and other data published by the manufacturer, to demonstrate conformance to the specifications requirements; model numbers alone will not be acceptable. The data shall also include the name and address of the nearest service and maintenance organization that regularly stock repair parts. Listings of items that function as parts of an integrated system shall be furnished at one time. One copy of the layout drawings, wiring diagrams and lists will be returned, marked to indicate approval.

All material / equipment shall be submitted for approval and only approved material / equipment shall be supplied to the site.

1.2 Equipment and Material:

The contract shall provide at his cost, samples of material, equipment for approval by the Engineer before order is placed for the same. Engineer may waive this requirement, if detailed published catalogues submitted by the contractor provide sufficient information for approval. These samples shall include but not limited to:

(a) Pipe Insulation and Covering
(b) Adhesive and Tapes
(c) Electrical Items (Power and Control Cables, Conduit, Circuit Breakers)
(d) Hangers and supports
(e) Copper Piping and fittings
(f) Condensate Drain Piping and fittings
(g) Air Devices

2.0 DX SPLIT AIR CONDITIONING UNITS:

2.1 General:

Dx Split system air-conditioning Units, cool only type Units to be in two parts indoor & outdoor units, including filters, evaporator coils, compressors, condenser coils, and fan section, connection to electric power point, refrigerant piping, remote sensors, control wiring, complete in all respect.

Provide units pre-piped, pre-wired, pre-charged refrigerant gas (Ozone Friendly Green Gas), factory assembled and factory tested, with all controls pretested prior to shipping. Provide a terminal strip with each electrical component individually and separately wired to strip. Provide a separate fuse, internally mounted, for each electrical component. A single fuse for multiple compressors or fan motors will not be accepted.

2.2 Indoor Unit:

2.2.1 Cabinet, Casing and Frame:

Unit framework to be formed of structural steel members of 12 to 14 gauge mild steel. After assembly paint the framework for maximum protection against rust. Exterior panels to be fabricated of 18 gauge galvanized steel finished with a baked acrylic enamel over an epoxy primer. Provide neoprene gasketing between panels and frame members; panels to be attached to the frame with quick release latches (no sheet metal screws). Insulate sections including compressor compartment with 1" thick, 3-lb./cu. ft. density fiberglass having an R value of 4.16.

Arrange units for full front, side and rear service access to all mechanical, electrical and refrigeration controls, check out of electrical control panel, without disrupting or interfering with air flow.

2.2.2 Supply Fan and Motor:

Provide single width, forward curved Class I & II supply fans secured to a machined, ground and polished solid steel shaft. Coat shaft with a rust inhibitor and support by two outboard bearings selected for a minimum 200,000 hours average life.

Provide three-phase NEMA design 'B', 40qC continuously rated fan motor with energy-saving design, .85 power factor, NEMA 'T' frame, open drip-proof, operating at 1750 rpm and supplied with grease-lubricated ball bearings.

2.2.3 Direct Expansion Coil:

Provide direct expansion coil with ½" OD seamless copper tubes

Expanded into copper fins, not less than 3 rows deep or more than 12 fins per inch. Provide evaporator coil with a distributor with side port for hot gas bypass and thermostatic expansion valve with adjustable superheat and external equalizer. Test coil at 300 PSIG air pressure under water, completely dehydrate and pressure test with refrigerant. Provide coils with heavy gauge, insulated, galvanized steel drain pans complete with mastic coating for corrosion protection.

2.2.4 Filters:

Provide filters having a 40% ASHRAE dust spot efficiency, U.L. Class I pleated media type 2-inch deep.

2.2.5 Evaporator Defrost Thermostat:

Provide defrost thermostat package with enclosure, wiring and hardware for field installation.

2.3 Condensing Unit:

2.3.1 General:

Provide units pre-piped and pre-wired, pre-charged refrigerant gas, factory assembled and factory tested, with all controls pre-tested prior to shipping. Design units for use with Ozone Friendly Green Gas Refrigerant.

Assemble all condenser components on a common base in a weatherproof housing. Provide condenser coil, condenser fans and motors, refrigerant reservoir, charging valve, all controls and holding charge of Refrigerant.

2.3.2 Condenser Coil:

Construct condenser coil of copper plate fins, mechanically bonded to seamless copper tubes. Circuit coil for sub-cooling. Test coils to 425 psi.

2.3.3 Condenser Fans and Motors:

Furnish direct driven, propeller type belt driven, centrifugal fans arranged for vertical horizontal discharge. Provide condenser fan motors of the permanently lubricated type, resiliently mounted. Provide a safety guard for each fan. Include controls for cycling fans for intermediate season operation and low ambient control. Balance each fan statically and dynamically.

2.3.4 Controls:

Locate factory wired controls in a separate enclosure. Provide high and

Low pressure switches and compressor overload devices. Incorporate a positive acting timer to prevent short cycling of compressor if power is interrupted. Timer to prevent compressor from restarting for approximately 5 minutes after shutdown.

2.3.5 Refrigerant Circuits:

Each refrigerant circuit is to be an independent circuit completely piped, tested, dehydrated and fully charged with oil and Ozone Friendly Green Gas Refrigerant. The Refrigerant circuits are to include compressor, condenser coil with integral liquid sub-cooler, liquid line service and charging valve, filter drier, and sight glass. Compressor units to include suction and discharge line braided-wire isolators.

2.3.6 Casing:

Make unit casing fully weatherproof for outdoor installation. Construct casing of galvanneal steel, zinc phosphatized and finished with baked enamel. Provide openings for power and refrigerant connections. Make panels removable for servicing. Provide heavy duty coil guards, unit mounting rails and drain holes.

2.4 Execution:

Provide refrigerant piping and accessories to connect condensing unit's condensers to indoor air conditioning units according to manufacturer's instructions.

Copper pipes shall be insulated with 1-1/4" (32 mm) thick closed cells synthetic elastomeric foam insulation and wrapped with self-adhesive waterproofing tape. Condensate drain shall be insulated with 3/8" (10mm) thick closed cell synthetic elastomeric foam insulation. Contractor to provide minimum 25 mm dia Condensate Drain and terminate to nearest drain point.

No insulation shall be applied to any system of piping until all pipe work has been tested, cleaned out and made tight. All insulation shall be applied in a manner consistent with good practice and methods. All longitudinal joints of pipe shall be at the top and bottom. Insulation shall be continuous through walls, floors, ceiling and partitions etc.

All insulated refrigerant pipes exposed to atmosphere shall be provided with a cladding of 26 gauge (0.55 mm) thick G.I. or aluminium sheet metal with proper support system for cladding works. Cladding works shall be painted with one coat of primer and two coats of finish paint, as approved by the Engineer and as direct by Engineer in charge.

2.4.1 Startup and Testing:

a. Manufacturer's service technician to check alignment of bearings, drives and motors after installation to ensure that no misalignment exists, or make any necessary alignment adjustments prior to startup.

b. The manufacturer shall furnish a start up check list to the Owner at least two months prior to start up. The list must be explicit as to the various items to be checked prior to start up.

c. Before units are started up, manufacturer to pump new grease into bearing housings to force out old grease and provide adequate lubrication.

d. Before acceptance of the equipment by the Owner, conduct all tests as required to demonstrate that the equipment operates mechanically, electrically and acoustically as specified.

e. Conduct a satisfactory performance test in the presence of the Owner / Engineer incharge. Any units found to vibrate beyond acceptable levels must be rebalanced in the field at the Contractor's expense.

2.5 Spare Compressors and Parts:

Minimum 10% spare shall be supplied as per Manufacturer's recommendations for two years continues operation.

3.0 EXHAUST FANS:

3.1 GENERAL:

The contractor shall supply and install fans of the type and capacity specified in Schedule Sheet and conforming to the specifications given herein. The contractor shall be responsible for the proper selection of the fans so that the specified operating conditions are obtained. Connection to the electric power point is in contractor scope. Motor shall be sized to provide the required BHP for meeting the specified conditions without overloading. The Fans shall be provided as per List of Approved Manufacturer's.

External static pressure given in the schedule are indicative and for guidance only. The Contractor shall calculate the external and total static pressure for all fans and shall submit the same for Engineer's review and approval before ordering the fans. Required fan and motor shall be provided without any additional cost and no variation or claim shall be entertained in this regard.

3.2 PROPELLER FANS:

Shall be supplied of the quality indicated on the drawings. Propeller fans shall operate on 220V/1 phase/50 Hertz A.C. current. Fans shall be directly mounted on the motor, and shall operate without disturbing noise, during normal operation. The discharge side of the fan shall be provided with self-closing shutters. Propeller fans shall be as manufactured by National Japan or approved equal local brand.

3.3 INSTALLATION:

3.3.1 General: Fans as shown on drawings shall be installed by the Contractor, complete in all respects and as per satisfaction of the Consultants. Fans shall be rigidly secured so that they operate without vibration and transmission of vibration to the structure shall be through isolated. Connection to ducting shall be through flexible connectors. Ducting connection to fan shall ensure lowest turbulence and smooth transition of sizes. All supporting arrangements of the fans shall be drawn up by the Contractor and submitted to the Engineer for approval.

Floor mounted fans shall be installed on concrete housekeeping pad at minimum of 100 mm above the floor, fan shall be mounted on vibration isolator. Structural suspended fans shall be installed using threaded rods and vibration isolator.

3.3.2 Commission & Testing: The fans shall be commissioned and tested by the Contractor.

4.0 DIFFUSERS, REGISTERS AND GRILLES:

4.1 GENERAL:

These shall be factory fabricated of anodized Aluminium extruded sections and shall distribute the specified quantity of air evenly over space intended, without causing noticeable drafts, or dead spots anywhere in the conditioned area. The Contractor shall confirm with the Architect regarding the interior colour scheme of the building to match the colours and type of the diffusers and grills. The Contractor shall be responsible for diffusion, spread, drop and throw. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactory, the units shall be re-selected to perform quietly and effectively in accordance with the manufacturer's recommendations as approved by the Consultant.

A schedule of all air inlets and outlets shall be submitted to the Consultant, indicating location, types, specified air quantity, neck or face velocity, sound power level values, pressure drop, throw and drop for registers and maximum and minimum diffusion range, prior to ordering. Diffusers and registers shall be provided with opposed blade volume controller with accessible key operator. The manufacturer of these units shall be as per list of approved manufacturers.

1. The cutting of false ceiling (tiles) shall be the responsibility of the HVAC contractor.
2. All air inlet and outlets shall be manufactured as per turtle & belly standards of air inlets / outlets.
3. Diffusers connected to VAV systems shall be the non-dumping type.
4. The interior of all grilles and diffusers is to be factory painted matt black.
5. All grilles, diffusers and registers shall be tested to the requirements of ASHRAE and ADC and ARI.

All grilles and diffusers supplied on this project shall be tested and rated in accordance with ASHRAE standard 70-72, ADC Test code 1062-GRD and ISO 3741.

Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air flow performance of outlets and inlets" and ARI 650 "Standard for air outlets and inlets" Test and rate louvers in accordance with AMCA 500 "Test Method for louvers, dampers, and shutters"

4.2 REGISTERS:

Shall be four-way directional-control type except that return and exhaust registers may be fixed horizontal or vertical louver type similar in appearance to the supply registers face.

Registers shall be provided with sponge rubber gaskets between flanges and walls or ceilings. Wall supply registers shall be installed at least 150 mm (6")

below the ceiling unless otherwise indicated. Type of registers shall be as indicated on the drawings or approved.

4.3 INSTALLATION:

Installation shall ensure that all lines are perpendicular and parallel to the building walls and other surfaces and properly centered so that complete symmetry is obtained.

All diffusers shall be installed directly to the supply air ducting, so that the weight of the diffusers is not transferred to the ceiling. Diffusers shall be so installed that the collar is flush with the ceiling. Gaskets shall be used to prevent leakage.

Registers and grills on sidewalls shall be fixed on deodar wooden frames. Frame thickness shall be 3 mm (1/8") less than the register/grill collar and shall cover the full width of the wall. Perfect alignment and symmetry shall be maintained.

After the system is in operation, if drafts, dead spots, or excessive noise are noticeable in the conditioned areas due to improper selection or construction of the air outlet, the grill/diffuser/register shall be changed to the proper type to remove the defect, without additional cost to the owner.

5.0 CLEANING, TESTING, BALANCING AND TEST DATA:

5.1 GENERAL:

a) The entire testing balancing and adjusting process to be thoroughly organized & planned. All activities, including the organization, procurement of required test instrumentation and the actual system should be scheduled as soon as practical after the installation has been completed.

b) The contractor shall appoint an independent agency specialized in the testing & balancing of HVAC systems as a third party and their appointment must be subjected to consultant's and client approval.

c) Testing and balancing shall be performed in accordance with NEBB (National Environmental Balancing Bureau) USA, code of practices and all final reports shall be signed and certified by the agency appointed to perform such works.

d) The TBA agency must carryout the preparatory works which shall include the planning and scheduling of all TBA procedures, collecting the necessary data, reviewing the data collected, studying the system to be balanced, recording the published data on the test report forms, and finally, making preliminary field checks of the HVAC equipment and systems.

e) The contractor shall submit six copies of the complete test procedure to the engineer for approval one month prior to the date of commencement of the balancing and performance test.

5.2 CLEANING AND ADJUSTING:

Pipe shall be cleaned free of scale and thoroughly flushed of all foreign matter. Temporary bypass shall be provided for all water coils to prevent flushing water from passing through coils. Strainers and valves shall be thoroughly cleaned of all debris and blown free of all small particles of rubbish and dust before installation of outer faces. Equipment shall be wiped clean, with all traces of oil, dust or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction, and after all construction dirt has been removed from the building, new filters will be installed.

Bearings shall be properly lubricated with oil or grease as per recommendations of the manufacturer. Belts shall be tightened to proper tension. All control valves and other miscellaneous equipment, are requiring adjustment shall be adjusted for setting indicated or directed. Fans shall be adjusted to speed indicated by the manufacturer to meet the specified conditions.

5.3 TESTING:

(a) Duct Work: Ducts, plenums and casings shall be tested and made substantially air tight at static pressure indicated for the system before covering with insulation or concealing in the masonry. The term substantially airtight shall be constructed to mean that no air leakage is noticeable through the senses of feeling or hearing.

5.4 BALANCING:

(a) Duct system shall be balanced to produce air quantities within 5% of that indicated.

5.5 PERFORMANCE TESTS:

After cleaning, balancing, and testing operations have been completed, as herein before specified, the system shall be tested as a whole to see that all items perform as an integral part of the system, and that temperature and conditions are evenly controlled throughout the building. Corrections and adjustments shall be made as necessary to produce the conditions indicated, at no additional cost to the Owner.

5.6 TEST DATA:

General: The Contractor shall provide the Consultant with typewritten schedules of readings taken during the balancing and testing operation for the following items:

5.6.1 Air Balance:

(a) Fans: Size, type, speed in revolutions per minute, static pressure in inches of water, air quantity in cubic feet per minute, and motor load in amperes and voltage.

(b) Coils: Size, face velocity in feet per minute, air-condition on-and-off Uni.-wet-bulb and dry-bulb temperature in °F., water temperature drop through heating/cooling coil, temperatures entering coil in °F.

(c) Ducts: Size, velocity in feet per minute, and air quantity in cubic feet per minute.

(d) Air Outlets and Inlets: Size, velocity in feet per minute, and air quantity in cubic feet per minute.

5.7 CONTROL SETTING:

The actual on site setting of all automatic controls including thermostats, safety controls, minimum damper settings, fan safety thermostats, pressure controls, temperature and humidity controls and other similar items shall be provided in the form of a tabulated list indicating type of control, location, setting and function.

5.8 OTHER EQUIPMENT:

The contractor shall also provide written data on the performance of any other equipment; in the form and manner and giving all information required by the Consultant/Engineer. The Contractor shall also submit a certificate along with all test reports submitted, certifying that all test have been carried out by component engineers, and that all data submitted has been verified and found to be correct.

5.9 TEST PROCEDURES:

The contractor shall be responsible to follow the test procedure as under

1. Preliminary inspection & tests.
2. Balancing and commissioning.
3. Performance tests
4. Reliability trail test.

6.0 PAINTING AND FINISHING:

6.1 GENERAL:

Painting shall include furnishing labour, materials, equipment, ladders, scaffolding, protective covers, other items required to prepare and finish surfaces of work specified herein or in any other sections.

Paint shall be applied as per manufacturer's printed application directions. Paint color schemes shall be specified at the time of painting or earlier.

Paint shall be applied to the following:

(a) Materials and Equipment: All materials and equipment factory fabricated, imported or otherwise shall be provided with a fresh coat of paint, of same colour as the original factory-paint. Unless otherwise directed by the Consultant. The items covered under this head shall include chillers, air handling units, fan coil units, pumps, Cooling tower, fans, etc.

(b) Piping and Pipe fittings and valves etc. shall be provided with two coats of red lead from an approved manufacturer. Chilled water piping shall be further provided with two finish coats. All valves etc. shall be painted in a colour, different from the colour on the adjacent pipe. Apply two coats of asphalt paint to all pipes laid in concrete or passing through concrete.

(c) Hangers and Supports shall be provided with two coats of red iron from an approved manufacturer. All hangers and supports exposed to view shall be further providing with two coats of finish paint of an approved colour.

All new surfaces to be painted are prepared properly to receive prime coat of paint. Surfaces shall be scraped or wire-brushed to remove mill scale, rust and clean with solvent of remove grease, oil and dirt. All surfaces shall be thoroughly dried before application of paint. Prime coat shall be suitable for subsequently applied finish coats. For prime coat red lead paint of an approved manufacturer shall be used, such as 'KROMIC' Synthetic Red Lead by Johnson & Nicholson shall be used.

Before finish coat is applied to all prime coated surfaces shall be properly touched up. The equipment and piping shall not be finished painted until they have been tested and approved. All succeeding coats shall be applied only when the undercoats are thoroughly dried.

For piping system identification a colour scheme based on American Standard "Scheme for identification of Piping System", "ASA A-13.1-1975" shall be specified and get approved by the Consultant and then this color scheme shall be used to finish painting.

6.2 STENCILING:

The Contractor shall stencil near each valve on the pipe, the name of the fluid. Also an arrow should be painted next to the legend indicating the direction of flow in pipe. The stencil legend shall be placed in a location so that it can easily be read from the floor.

6.3 IDENTIFICATION TAGS:

Shall be installed on valves, controls and other parts of the system where directed to do so. Tags shall be polished or lacquered brass 40 mm round, or octagonal with stamped letters or numbers, 12 mm high, filled with black paint and fastened securely with brass "S" hooks or chains.

The Contractor shall further provide charts, diagrams, of size and type as approved designating number, service or function and location of each tagged item.

6.4 PIPING AND DUCT WORK IDENTIFICATION:

1. After completion of insulation and /or painting, all piping and ductwork exposed or concealed shall be marked in english to show the services name and direction of flow.

2. Marking shall be placed at each side of any wall, partition or floor, at 10m intervals on all exposed piping and ductwork and at each access panel or door. Marking shall be located so as to be in full view.

3. Marking shall be stenciled. Use black stencil on light coloured surfaces, yellow stencils on dark coloured surface except where fire lines which shall be stenciled in accordance with civil defence requirements. Stencils shall have distinct edges. Blurred stencils are not acceptable. The name of the services shall be stenciled fully or with abbreviations standard to the industry. Non standard abbreviations are not acceptable. Letters shall be a minimum of 50mm high for ducts and for pipes 75mm or larger to outside of insulation. Letters for smaller pipes shall be 20mm high. All markings shall be clearly legible from 1.5m above the adjacent floor or platform.

7.0 TEST RUN

GENERAL:

After completion of the installation of the Systems the Contractor shall carry out a two months test run in summer or as per direction of the client or consultant. The certificate of substantial completion shall be provided on completion of the test run to the satisfaction of the Consultant and in keeping with the stipulations of relevant clauses of the General & Special Conditions of Contract. This test run shall be constructed to form a part of the "Performance Tests" specified herein before.

8.0 LIST OF APPROVED MANUFACTURERS:

S.NO.	EQUIPMENT / MATERIAL	RECOMMENDED MANUFACTURERS
1	WALL MOUNTED DX SPLIT AIR CONDITIONING UNITS	a) DAIKIN b) GREE c) HITACHI d) MITSUBISHI
2	COPPER PIPING	a) MUELLER b) YORKSHIRE c) CRANE ENFIELD d) NIBCO
3	GI SHEET FOR DUCTS	a) PAKISTAN STEEL b) JAPAN MAKE c) ISL MAKE
4	VOLUME DAMPERS & FIRE DAMPERS	a) THERMEC, PAKISTAN b) WESTERN AIR DUCT, PAKISTAN c) STEEL CRAFT, PAKISTAN
5	FLEXIBLE DUCTS WITH INSULATION	a) ATCO, UAE b) AFS, TURKEY c) IZOCAM, TURKEY
6	AIR DISTRIBUTION OUTLETS	a) THERMEC, PAKISTN b) WESTERN AIRDUCTS, PAKISTAN c) STEEL CRAFT, PAKISTAN
7	HANGERS & SUPPORTS	a) HILTI, GERMANY b) FISHER, GERMANY c) SIKLA, UK d) MUNGO, SWITZERLAND
8	HVAC FANS	a) SASA. b) AEROTECH c) JALAL
9	ELECTRIC CABLES	a) PAKISTAN CABLES b) NEW AGE CABLES c) POINEER CABLES
10	STEEL CONDUIT FOR ELECTRICAL WORKS	a) HILAL, PAKISTAN b) PREMIER, PAKISTAN

(Sect. 15140) - DOMESTIC WATER PIPING

(Sect. 15145) - DOMESTIC WATER PIPING SPECIALTIES

(Sect. 15150) - SANITARY WASTE, VENT AND STORM PIPING

(Sect. 15155) - DRAINAGE PIPING SPECIALTIES

(Sect. 15315) - FIRE PUMPS

(Sect. 15410) - PLUMBING FIXTURES

(Sect. 15441) - PLUMBING PUMPS

Sect.15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02 SUMMARY

A. This Section includes domestic water piping inside the building.

1.03 DEFINITIONS

A. CPVC: Chlorinated polyvinyl chloride plastic.

B. PEX: Crosslinked polyethylene plastic.

C. PVC: Polyvinyl chloride plastic.

D. PPR: Poly propylene Random

1.04 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with 125 psig (860 kPa) unless otherwise indicated.

1.05 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples:

C. Field quality-control test reports.

1.06 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components

C. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Refer Approved List of Manufacturers.

2.02 PIPING MATERIALS

A. The pipe materials shall as stated below.

2.03 DOMESTIC COLD WATER BELOW AND ABOVE GRADE

1. Polypropylene pipes and pipe fitting PN20 to DIN 8077 for pipe size upto 110mm dia.

2. uPVC pipes to BS 3505 with Class E with solvent welded fittings to BS 4346 for pipe sizes above 110mm dia.

2.04 DOMESTIC HOT WATER PIPING

1. Polypropylene pipes and pipe fitting PN20 to DIN 8077 for pipe size upto 110mm dia.

2. cPVC Sch 80 pipes with solvent welded fittings for pipe sizes above 110mm dia.

2.05 IRRIGATION PIPES

1. uPVC pipes to BS 3505 with Class E with solvent welded fittings to BS 4346 for all pipe sizes.

2.06 VALVES

A. Generally, all valves of the same type shall be of the same manufacturer. All gate, globe, angle, and swing check valves as a group shall be of the same manufacturer. All valves 50 mm and smaller shall be threaded and have bronze bodies.

B. All valves 65 mm and larger shall be Cast iron type and shall be flanged (or grooved for grooved coupling joints).

C. For PPR piping use PPR Coated valves of the same piping material and manufacturer.

D. Each valve shall be marked (engraved, stamped, or cast on each valve or metal tag, permanently attached to the valve) at the factory with the following minimum information
   1. Manufacturer's Name.
   2. Catalogue or Figure No.
   3. Size and Pressure Class.

E. Arrows to indicate direction of flow on check, globe, angle, non-return, and eccentric plug valves.

2.07 GATE VALVES

A. [Size 50 mm and Smaller]. Furnish bronze valves with screwed-in bonnet, non-rising stem, solid wedge disc, and threaded ends. Pressure rating PN20.

B. [Size 65 mm and Larger]. Furnish Iron Body Bronze Mounted (IBBM) valves, i.e. cast iron body bronze trim valves, with bolted bonnet, non-rising stem, solid wedge disc, flanged ends, and renewable seat rings.

2.08 GLOBE VALVES.

A. [Size 50mm and Smaller]. Furnish valves designed for minimum PN20 working pressures.

B. [Size 65 mm and Larger]. Furnish valves designed for minimum PN16 working pressure.

2.09 CHECK VALVES

A. [50 mm and smaller]. Furnish swing valves designed for minimum PN20 non-shock working pressures. Valves shall have renewable discs and side plugs, integral seats.

B. [Size 65 mm and Larger Water Check Valves]. Valves shall be silent type spring loaded of the double door or wafer style. Valves shall be designed for minimum PN16 non shock water working pressure.

2.010 RELIEF VALVES.

Domestic Water Temperature and Pressure Relief Valve.

A. On hot water storage tanks provide an ASME rated thermostatic, self-closing, temperature and pressure relief valve, located in the relief valve openings of tanks. Valve shall have a minimum thermal discharge capacity equal to the input capacity of the heater standard pressure setting of 600 kPa and standard temperature setting of 100 - 140 degrees C. Relief valve pipe to discharge to floor drain.

2.011 BALL VALVES.

A. [Size 50 mm and Smaller]. Valves shall be standard port, 2-piece construction with screwed ends. Valves shall be designed for minimum PN25. Valves shall have bronze or brass body, stainless steel ball, steel handle with vinyl grip.

B. [Size 65 mm and Larger].Valves shall be standard port, BS 5159 with flanged ends. Valves shall be designed for minimum PN16 working pressure. Valves shall have steel body, chrome or nickel plated steel or stainless steel ball.

2.012 Float Valves

A. Float valves shall be installed as indicated in the drawings to provide consistent level control in reserve supply water storage tanks. The valve shall meet the requirements of the Water Byelaws for air gaps and shall be constructed throughout in approved materials and shall prevent back siphoning. Bronze equilibrium float valves 80 and above shall be flanged end, flat faced and drilled to suit BS4504 PN16.

B. Bronze equilibrium float valves upto 50 shall be screwed end BS2779 parallel and shall be provided complete with back nut.

C. Floats for valve sizes 80mm and above shall be of copper.

2.013 Solenoid Valves

A. Electrically operated solenoid valves shall be single phase 220V and shall be rated for the system pressure

2.014 Bib Taps

A. Bib-cocks shall be in accordance with BS 1010: 1973. They shall be provided with hose union nosepiece and hand wheel operated.

2.015 Automatic Air Valves

A. Automatic air valves shall have a bronze body with bolted cover and a 9mm top outlet.

2.016 Strainers

A. Up to and including DN50 strainers shall be manufactured from bronze and shall be of the ‘Y’ type with bolted cap, PN25 temperature/pressure rating.

B. Strainers above DN50 shall be manufactured from cast iron and shall be of the ‘Y’ type with bolted cap, PN16 temperature/pressure rating and shall be complete with drilled and tapped caps complete with drain cocks.

C. Strainers shall be provided with a medium grade screen sized such that in their clean condition the maximum pressure drop at the design flow rate shall not exceed 6kPa.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavating, trenching, and backfilling are specified in Section "Earthwork."

3.02 PIPE AND FITTING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Grooved joints may be used on aboveground grooved-end piping.

3.03 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
2. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
3. Drain Duty: Hose-end drain valves.

B. PPR Coated PN-25 rated ball, butterfly, and check valves may be used in matching piping materials.

3.04 PIPING INSTALLATION

A. Install domestic water piping level without pitch and plumb.

B. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

3.05 HANGER AND SUPPORT INSTALLATION

A. Install supports according to Division 15 Section "Hangers and Supports."

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

D. Install hangers for PVC/cPVC/PPR and PE piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 (DN 50) and Smaller: 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
5. NPS 8 (DN 200): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

E. Install supports for vertical PVC/cPVC/PPR piping every 48 inches (1200 mm).

3.06 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to water pressure of 150 psi or 50 psi above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

END OF SECTION 15140

Sect.15145 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Balancing valves.
2. Strainers.
3. Outlet boxes.
4. Hose stations.
5. Hose bibs.
6. Drain valves.
7. Water hammer arresters.
8. Air vents.
9. Flexible connectors
10. Flow Sensing Devices
11. Puddle flanges

1.03 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa), unless otherwise indicated.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

C. Field quality-control test reports.

D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.01 BALANCING VALVES

A. Refer Section 15140

2.02 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers :

1. Pressure Rating: 125 psig (860 kPa) minimum, unless otherwise indicated.
2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 (DN 65) and larger.
3. End Connections: Threaded for NPS 2 (DN 50) and smaller;flanged for NPS 2-1/2 (DN 65) and larger.
4. Screen: Stainless steel with round perforations, unless otherwise indicated.
5. Perforation Size:

    a. StrainersNPS 2 (DN 50) and Smaller: 0.020 inch (0.51 mm) .
    b. Strainers NPS 2-1/2 to NPS 4 (DN 65 to DN 100): 0.045 inch (1.14 mm)

6. Drain: Factory-installed, hose-end drain valve.

2.03 HOSE BIBBS

A. Hose Bibbs :

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
8. Finish for Service Areas: Rough bronze, or chrome or nickel plated.
9. Finish for Finished Rooms: Chrome or nickel plated.
10. Operation for Equipment Rooms: Wheel handle or operating key.
11. Include operating key with each operating-key hose bibb.

2.04 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).

4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Gate-Valve-Type, Hose-End Drain Valves

1. Standard: MSS SP-80 for gate valves.
2. Pressure Rating: Class 125.
3. Size: NPS 3/4 (DN 20).
4. Body: ASTM B 62 bronze.
5. Inlet: NPS 3/4 (DN 20) threaded or solder joint.
6. Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

C. Stop-and-Waste Drain Valves :

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: 200-psig (1380-kPa) minimum CWP or Class 125.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy or ASTM B 62 bronze.
5. Drain: NPS 1/8 (DN 6) side outlet with cap.

2.05 WATER HAMMER ARRESTERS

A. Water Hammer Arresters :

1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Metal bellows / Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.06 AIR VENTS

A. Bolted-Construction Automatic Air Vents :

1. Body: Bronze.
2. Pressure Rating: 125-psig (860-kPa) minimum pressure rating at 140 deg F (60 deg C).
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 1/2 (DN 15) minimum inlet.
6. Air vents shall be installed on all coils and all other high points required for efficient operation and venting of system.

7. Air vents shall be provided at all high points in the pipework, whether indicated on the drawings or not.

8. Large diameter automatic air vents shall be provided at all primary venting positions, such as plant rooms and at the head of vertical risers.
9. Air bottles shall be provided at all venting points.
10. The Sub CONTRACTOR shall be responsible for the design and positioning of all air vents.

2.07 PUDDLE FLANGES

A. Where pipework passes through the external walls of the buildings or trenches below ground level, the CONTRACTOR shall supply and cast or built puddle flanges into the structure.

B. Puddle flanges are to be manufactured from the same material as the pipework of which they form a part.

C. Each puddle flange shall comprise a length of pipe, flanged or screwed at end according to diameter with an undrilled slip on flange welded on the outside at a point where it will be located mid way in the thickness of the wall. The puddle flange is to be painted externally with two coats of bituminous paint before being built into the structure.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

B. Install balancing valves in locations where they can easily be adjusted.

C. Install Y-pattern strainers for water on supply side of each pump.

D. Install water hammer arresters in water piping according to PDI-WH 201.

E. Install air vents at high points of water piping. [Install drain piping and discharge onto floor drain.]

END OF SECTION 15145

Sect.15150 - SANITARY WASTE, VENT AND STORM PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.

1.03 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. LLDPE: Linear, low-density polyethylene plastic.

D. NBR: Acrylonitrile-butadiene rubber.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. TPE: Thermoplastic elastomer.

1.04 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa) .
2. Sanitary Sewer, Force-Main Piping: 150 psig (1035 kPa).

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events.

1.05 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings:

1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.
2. Drainage System: Include plans, elevations, sections, and details.

C. Field quality-control inspection and test reports.

1.06 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Piping materials shall be as under.

2.02 ABOVE GROUND SOIL, WASTE AND VENT PIPE

A. All horizontal soil, waste pipes and rain water shall be Poly Propylene (PP) sound proof drainage pipes as per DIN 4109 and Din 4102 and fittings made of mineral-reinforced polypropylene homopolymer and copolymer. The typical density of the mineral filler shall be between 1.65 to 2.03 g/cm3 according to DIN 53479.

B. The sound isolation shall be 13 DB for 4.0 l/s flow rate in accordance with DIN 52379 and DIN 4109

C. The sound proof pipes & fittings shall be fire resistant class B2 to DIN 4102.

D. The sound proof pipes & fittings shall be fungus and bacteria resistant, and shall have smooth surface, corrosion resistant.

E. Soundproof drainage pipe system shall comply with following standards:
1. DIN 4109m sound proof, absorption standards.
2. DIN 4102, B2. Self-extinguishing flameless.
3. DIN 19560 / DIN EN 1451. Hot water resistance, 95°C (Long term), 95°C (short term).

4. Physical Characteristics

Density	1.65 g/cm³ DIN 53479
Elongation at break	50%
Tensile strength E-modulus Linear expansion	20N / mm²
E-modulus	3800 N / mm²
Linear expansion	0.04 mm / mk

5. The floor trap shall also be of sound proof material to DIN 4109.

2.03 BELOW GROUND SOIL AND WASTE PIPE

A. uPVC conforming to the following British Standards:
   1. Pipes 110mm and 300mm diameter: uPVC pipe with solvent weld fitting as per BS 4660 (BS EN 1401)
   2. Pipes larger than 300mm diameter: to BS 3506.

2.04 STORM WATER PIPE

A. Plastic pipes shall be extruded un-plasticized PVC (UPVC) conforming to the following British Standards:
   1. uPVC pipe with solvent joints (as approved by consultant) as per DIN 8061/8062 and ISO 3633 Type B

2.05 CONTENSATE DRAIN PIPING (ABOVE AND BELOW GRADE)

A. uPVC conforming to the following British Standards:
   1. Pipes 20mm and 300mm diameter: Upvc class ‘E’ pipe with solvent weld fitting as per BS 3505 (EN 1401).

2.06 PRESSURE PIPING FROM PUMPS (ABOVE AND BELOW GRADE)

A. uPVC conforming to the following British Standards:

1. Pipes 20mm and 300mm diameter: Upvc class 'E' pipe with solvent weld fitting as per BS 3505 (EN 1401).

B. Alternatively (Kite Mark) pipes are acceptable only if approved by consultant.

2.07 SPECIAL PIPE FITTINGS

2.08 ENCASEMENT FOR UNDERGROUND PIPING CROSSING DRIVEWAYS

A. All Drainage pipes crossing driveways and subjected to heavy traffic shall be provided in concrete encasement.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Refer to "Earthwork" for excavating, trenching, and backfilling.

3.02 PIPING INSTALLATION

A. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

B. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.

E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2 DN 50 and smaller; 1 percent downward in direction of flow for piping NPS 3 (DN 75) and larger.
2. Horizontal Sanitary Drainage Piping: 1 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

F. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

G. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction or Consultant.

3.03 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Division 15 Section "Hangers and Supports." Install the following:

B. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and 5 (DN 100 and 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
5. NPS 8 to NPS 12 (DN 200 to DN 300): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

C. Install supports for vertical PVC piping every 48 inches (1200 mm).

3.04 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated.

3.05 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.06 PROTECTION

A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION 15150

Sect.15155 - DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02 SUMMARY

A. This Section includes the following drainage piping specialties:
   1. Cleanouts.
   2. Floor drains.
   3. Trench drains.
   4. Channel drainage systems.
   5. Roof drains.
   6. Manhole Covers
   7. Miscellaneous drainage piping specialties.

1.03 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High-density polyethylene plastic.

E. PE: Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PUR: Polyurethane plastic.

H. PVC: Polyvinyl chloride plastic.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated above.

B. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.06 COORDINATION

A. Coordinate size and location of concrete bases.

B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.01 CLEANOUTS

A. Plastic Floor Cleanouts:

1. Size: Same as connected branch.
2. Body: PVC.
3. Closure Plug: PVC.
4. Riser: Drainage pipe fitting and riser to clean out of same material as drainage piping.
5. Finish: Stainless steel cap

2.02 FLOOR DRAINS

A. Plastic Floor Drains:
1. Material: PP Soundproof as per piping material
2. Outlet: Side
3. Sediment Bucket: Not required.
4. Top or Strainer Material: Stainless steel <Refer Architect finishes schedule>.
5. Top of Body and Strainer Finish: Stainless steel.
6. Top Shape: Square. <Refer Architect finishes schedule>.
7. Trap Material: Plastic drainage piping.
8. Trap Pattern: Standard Multi Floor Trap with Multiple inlets and one outlet.

B. Funnel floor drain where specified on drawings shall include a nickel bronze funnel secured to the grating

2.03 TRENCH DRAINS

A. Trench Drains :

1. Standard: ASME A112.6.3 for trench drains.
2. Outlet: Side.
3. Grate Material: Cast Iron/PVC. <Refer Architect finishes schedule>.
4. Grate Finish: Epoxy coated for cast iron <Refer Architect finishes schedule>.
5. Dimensions of Frame and Grate: Refer drawings
6. Top Loading Classification: As mentioned on MEP drawings and BOQ.

2.04 ROOF DRAINS

A. Plastic Roof Drains:

1. Standard: ASME A112.21.2M.
2. Pattern: Balcony/ Roof drain.
3. Body Material: PVC.
4. Dimensions of Body: Refer Drawings
5. Outlet: Bottom.
6. Dome Material: PVC/Stainless Steel <<Refer Architect finishes schedule>.

2.05 MISCELLANEOUS DRAINAGE PIPING SPECIALTIES

A. Vent Caps:

1. Description: PVC of same brand as of piping.
2. Size: Same as connected stack vent or vent stack.

B. Expansion Joints:

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

C. Manholes/gully traps covers

1. All covers shall be Cast Iron with black bitumen coating. Manhole covers shall have clear opening of 600 x 600 mm.

2. All manholes and gully traps shall be vented as per drainage department requirements.

3. Gully trap covers shall have clear opening of 300 x 300 mm.

4. All manhole covers and frames shall comply with BS 497:1976 (BS EN 124:1994)

5. Covers in paved areas shall be medium duty type having weight as per Table 1

6. Covers in plinth protection shall be light duty having weight as per Table-1

7. Covers in Driveways shall be Heavy duty having weight as per Table-1

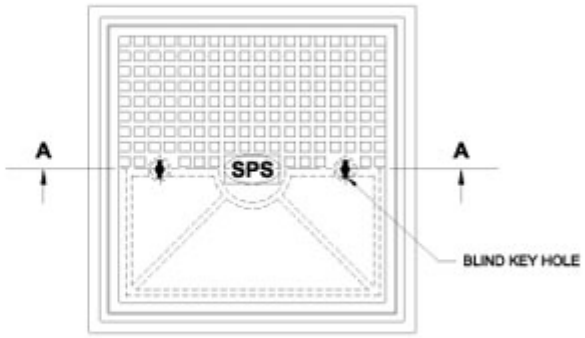
CAST IRON MULTI DUTY MANHOLE COVER & FRAME

Features :

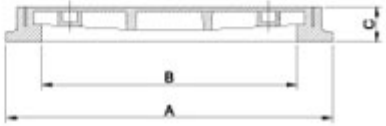
Single Seal
Closed Key Holes
Coating Cold Applied

Option :

Ductile Iron
Epoxy Coated
Lockable



PLAN



SECTION A-A

Table 1-1 (Manhole Covers Weights)

S.no	Cover material	Clean Opening	Type	Weight	Standard	Remarks
1	Cast Iron	600 x 600	Light duty	45 Kg	BS EN 124:1994	
2	Cast Iron	600 x 600	Medium duty	67 Kg	BS EN 124:1994	
3	Cast Iron	600 x 600	Heavy duty	90 Kg	BS EN 124:1994	

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.

2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

E. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

F. Assemble and install ASME A112.3.1, stainless-steel channel drainage systems according to ASME A112.3.1. Install on support devices so that top will be flush with surface.

G. Install fixture air-admittance valves on fixture drain piping.

H. Install stack air-admittance valves at top of stack vent and vent stack piping.

I. Install air-admittance-valve wall boxes recessed in wall.

J. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

K. Install through-penetration firestop assemblies in plastic stacks at floor penetrations.

L. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

M. Install vent caps on each vent pipe passing through roof.

N. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.

O. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

P. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.
2. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.
4. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

Q. Install grease removal devices on floor. Install trap, vent, and flow-control fitting according to authorities having jurisdiction. Install control panel adjacent to unit, unless otherwise indicated.

R. Install oil interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

S. Install solids interceptors with cleanout immediately downstream from interceptors that do not have integral cleanout on outlet. Install trap on interceptors that do not have integral trap and are connected to sanitary drainage and vent systems.

T. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.02 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

B. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

C. Oil Interceptors: Connect inlet, outlet, vent, and gravity drawoff piping to unit; flow-control fitting and vent to unit inlet piping; and gravity drawoff and suction piping to oil storage tank.

3.03 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Grease interceptors.
   2. Oil interceptors.
   3. Solids interceptors.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled FOG disposal systems and grease removal devices and their installation, including piping and electrical connections, and to assist in testing.

B. Tests and Inspections:

   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.05 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain FOG disposal systems and grease removal devices.

END OF SECTION 15155

SECTION 15315

FIRE FIGHTING PUMPS

Table of Contents

PART 1 - GENERAL 1

1.1 Work Included 1

1.2 Description of Work 1

1.3 Quality Assurance 1

1.4 Submittals 1

1.5 Product Delivery, Storage and Handling 2

PART 2 - PRODUCTS 2

2.1 Fire Pumps 2

PART 3 - EXECUTION 9

3.1 Examination 9

3.2 Concrete Equipment Bases 9

3.3 Installation 9

3.4 Alignment 10

3.5 Connections 10

3.6 Field Quality Control 10

3.7 Testing and Commissioning 11

3.8 Training 12

3.9 Spares 12

FIRE FIGHTING PUMPS

PART 1 - GENERAL

1.1 Work Included

1.1.1 Compliance with relevant General Requirements of Mechanical Services.

1.2 Description of Work

1.2.1 Furnish and install pumps as indicated on drawings

1.2.2 This section specifies the requirements for the fire pump set.

1.2.3 Provide the electrical works related to this section, in compliance with the requirements of relevant electrical sections:

1.3 Quality Assurance

1.3.1 Manufacturer's Qualifications: Firms regularly engaged in manufacture of general use, centrifugal pumps with characteristics, sizes and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3.2 Certification, Pump Performance: Provide pumps whose performances, under specified operating conditions, are certified by manufacturer.

1.4 Submittals

1.4.1 Product Data: Submit manufacturer's pump specifications, installation and startup instructions, and current accurate pump characteristic performance curves with selection points clearly indicated.

1.4.2 Shop Drawings: Submit manufacturer's assembly type shop drawings indicating dimensions, weight loadings, required clearances and methods of assembly of components.

1.4.3 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to pumps. Submit manufacturer's ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory – installed and portions to be field installed.

1.4.4 Full hydraulic calculations based on shop drawings to verify actual flow and head operating conditions. Calculations shall be approved by the Consultant prior to final selection of equipment.

1.4.5 Maintenance Data: Submit maintenance data and parts lists for each type of pump, control and accessory, including "trouble – shooting" maintenance guide. Include this data, product data, shop drawings and wiring diagrams in maintenance manual.

1.5 Product Delivery, Storage and Handling

1.5.1 Handle pumps and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged pumps or components, replace with new items.

1.5.2 Store pumps and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

1.5.3 Witness test for Fire pump has to be performed by the Consultant, Client and Contractor. The witness test shall be carried out in country of origin and pump performance shall evaluated as per NFPA-20

PART 2 - PRODUCTS

2.1 Fire Pumps

The Fire Pump Set shall comprise of an Electrical Driven main pump, Diesel engine driven Standby pump and Electric driven jockey pump. The Set shall include all piping, fittings, valves, accessories, relief valves, test lines from Suction header to Discharge Header. The System shall be skid mounted on a combined base including battery banks, fuel tank, fuel piping and exhaust piping.

2.1.1 Jockey Pump (Vertical Multi Stage)

a) Type The contractor shall furnish and install as shown on the plans a fire rated type jockey pump. Vertical, multistage centrifugal, especially designed and constructed for quiet operation.

Pump material shall be: Impeller: Stainless steel Shaft: Stainless steel Stage Housing: Stainless steel End housing: Cast iron. Seal: Mechanical.

b) Motor Shall be drip proof, squirrel cage induction, delta wound, Class F insulation, calss B temperature rise, 2900 RPM and shall be especially selected for quiet operation. The horsepower of the motor shall be of such a size as to insure non overloading of the motor throughout the capacity range of the pump.

c) Controls the jockey pump shall have a relief valve set for the proper pressure and a pressure switch for automatic operation. There shall be a magnetic across the line starter with "HandOffAutomatic" selector switch in cover provided to start and stop the pump. Panel shall be UL/FM approved.

Pump controller shall be factory pre-wired and tested. Pressure switch shall sense low pressure in the fire pump system. Set cut-in pressure 5 psi above main fire pump cut-in pressure. Set cut-out pressure at system pressure. Provide minimum run timer to operate the pump for a minimum of 3 minutes.

Across the line start, H-O-A selector switch.

Control panel to contain a fusible 3-pole disconnect switch, magnetic motor contractor and thermal overload relays with external reset. Enclosure to be wall mounted with hinged door

2.1.2 Diesel Driven Pump

a) Fire pump shall constitute a diesel engine and fire pump of End Suction Fire pump. Pump specification shall be as mentioned above under item 2.1.1 except for pump speed which shall be accordingly to the choice of the diesel engine speed.

b) Rating of diesel engine shall be chosen at the prevailing conditions of 120 deg F. and a humidity ratio of more than 90%.

c) Automatically Controlled Diesel Engine

d) The diesel engine for driving the fire pump shall be UL listed, FM approved specifically designed for fire pump service. It shall develop sufficient horse power to drive the pump and shall have bare engine brake horse power not less than 20 percent greater than the maximum horsepower required to drive the pump at its rated RPM.

e) The engine shall be an open type self contained power unit including the following accessories :

- Stub shaft
- Fuel pumps and filters.
- Air Cleaner.
- Adjustable governor capable of regulating engine speed within a range of 10 percent between shutoff and maximum load conditions. The governor shall be set to maintain rated pump speed at maximum pump load.
- Lube oil pump.
- Lube oil filter.
- Over speed shut down device arranged to shut down engine at a speed approximately 20 percent above rated engine speed and with manual reset. The over speed shut down device shall be so supervised that the automatic engine controller will continue to show an over speed trouble signal until the device is manually reset to normal operating position.
- Electric Starter, generator or alternator and voltage regulator.
- Dual storage battery units. Each unit shall have capacity to maintain cranking speed through a 6 minute cycle (15 seconds cranking and 15 seconds rest, in 12 consecutive cycles). Provide certification that the battery unit complies with this requirement. Batteries shall be furnished in a dry charge condition, with electrolyte liquid in a separate container. Electrolyte shall be added at the time the engine is put in service, and the battery is given a conditioning charge.
- Dual battery chargers, automatically controlled.

- Chargers shall be specifically designed for fire pump service.
- The rectifier shall be a semiconductor type.
- The charger for a lead acid battery shall be a type which automatically reduces the charging rate to less than 500 milliamperes when the battery reaches a full charge condition.
- The control equipment incorporated in an "off on" type of charger for a lead acid battery shall start the rectifier hourly. It shall shut off automatically when the battery has been fully charged.
- The battery charger at its rated voltage shall be capable of so delivering
- Energy into a full discharged battery in such a manner that it will not damage the battery. It shall restore to the battery 100 percent of the battery's ampere hour rating within 24 hours.
- An ammeter with an accuracy of five percent of the normal charging rate shall be furnished to indicate the operation of the charger.
- The charger shall be designed so that it will not be damaged or blow fuses during the cranking cycle of the engine when operated by an automatic or manual controller.
- A manual charge switch with indicator light shall be provided or, in lieu thereof, the charger shall automatically charge at the maximum rate whenever required by the state of charge of the battery.
- When not connected through a control panel it shall be arranged to indicate loss of current output on the load side of the dc over current protective device.
- Storage batteries shall be substantially supported, secured against displacement, and located where they shall be readily accessible for servicing.
- Engine cooling system shall be by unit mounted radiator.
- Engine jacket temperature regulating device.
- Engine jacket water pump.
- Instrument panel with water temperature gauge, oil pressure gauge, ammeter, tachometer of the totalizing type or an hour meter.
- Exhaust mufflers and flexible connectors, stainless steel non sparking.
- The engine shall be arranged for automatic operation with all wiring terminating in a junction box suitable for field hookup.

- Exhaust piping from flexible connection at engine to muffler and from muffler to point of discharge to atmosphere shall be schedule 40 black steel pipe and fittings, welded. A flap valve shall be provided at the external end of piping.

- Pump and diesel engine shall be mounted on a common base plate, direct connected through a flexible coupling, and equipped with a coupling guard. Coupling shall be a spacer type to permit pump shaft and impellers to be removed without moving diesel engine or pump bottom casing.

2.1.4 Automatic Diesel Engine Control Panel

2.1.4.1 The automatic engine control panel shall be UL listed, FM approved specifically designed for fire pump service. The panel shall be enclosed in a floor mounted duct and moisture resistant housing. The controller shall have possibility to program the start/stop of equipment for periodic maintenance.

2.1.4.2 The controller shall be the combined manual and automatic type including a "ManualOffAutomatic selector switch.

2.1.4.3 A pressure switch and single phase power failure relay with local visual indication and auxiliary contact for remote indication of 240 volt AC power failure shall be provided which will, upon drop in system pressure or loss of single phase AC power, cause the controller to open or close all circuits necessary to automatically start the engine by performing the following functions:

a) Turn on fuel supply.

b) Crank the engine in a series of crankrest cycles automatically alternating between the dual batteries on each cycle.

c) Disconnect cranking motor upon engine start.

d) Once the engine is started, it shall remain in operation until shut down manually. A signal in the Synoptic Panel shall indicate that the Diesel Engine is operating.

e) If the engine should fail to start after several cranking attempts, the controller shall disconnect all starting circuits and energize an audible and visual alarm to indicate "overcrank" in the synoptic panel as well as in the engine control panel.

2.1.4.4 Alarm and Signal Devices on Controller

a) A pilot lamp(s) shall be provided to indicate that the controller is in the "automatic" position. The lamp shall be accessible for replacement.

b) Separate pilot lamps and a common bell shall be provided to indicate trouble caused by:

Low oil pressure in the lubrication system. The controller shall provide means for testing the position of the pressure switch contacts without causing trouble alarms.

Failure of engine to start automatically.

Shutdown from overspeed.

Battery failure. Each battery shall be provided with separate lamps which shall be lighted or extinguished on battery failure on attempt to start.

High engine jacket water temperature.

2.1.4.5 Water Pressure Control: A pressure actuated switch having high and low calibrated adjustments and responsive to water pressure in the fire system shall be provided in the controller circuit. Suitable provision shall be made for relieving pressure to the pressure switch to test the operation of the controller and the pump.

2.1.4.6 Enclosure: The structure or panel shall be securely mounted in an enclosure(s) which will protect the equipment against mechanical injury and falling drops of water striking the enclosure from the downward vertical. All switches required to keep the controller in the "automatic" position shall be within the locked cabinets having to break glass panels.

2.1.4.7 A wiring diagram shall be provided and permanently attached to the inside of the enclosure showing exact wiring for the controller, including a legend of identifying numbers of individual components. All wiring terminals shall be plainly marked to correspond with the wiring diagram furnished.

2.1.4.8 Wiring Elements : Wiring elements of the controller shall be designed on a continuousduty basis.

2.1.4.9 Field Wiring : All wiring leading from the panel to the engine and to the batteries shall have adequate carrying capacity. Such wiring shall be protected against mechanical injury. Controller manufacturer's specifications for distance and wire size shall be followed. Provision for connection to BMS shall be provided.

2.1.4.10 Marking : Each operating component of the controller shall be marked to plainly indicate an identifying number referenced to the wiring diagram. The markings shall be located so as to be visible after installation.

Instructions : Complete instructions covering the operation of the controller shall be provided and conspicuously mounted on the controller.

2.1.5 Fuel Storage Tank and piping

The fuel storage tank and piping shall be an integral part of the unit and shall be mounted within the support base of the unit. The tank shall have a capacity of 8 hours operation. Provide all piping, fittings and valves required.

The unit support base shall be designed to allow space for oil pan clearance.

Fuel piping material shall be black steel seamless sch.40. Both piping and tank to be UL listed and shall be as per NFPA-20

2.1.6 Tests

2.1.6.1 Prior to shipment, the pump and engine shall be thoroughly shop tested as a unit by the pump manufacturer. A characteristic curve showing the pump performance based upon the results of the shop test shall be submitted to the prior to shipment, and shall include the performance pump and engine at the set governor's speed. Absence of these test reports, indicating that the complete unit has been tested in the factory by the driver, will be ample grounds for the equipment rejection.

2.1.6.2 Each control panel shall be fully assembled and factory tested by the control manufacturer prior to their shipment, and evidence of this test shall be furnished with the controller.

2.1.6.3 Field Acceptance Tests

a) The field acceptance test results shall be as good as the manufacturer's certified shop test characteristic curve for the pump being tested within the accuracy limits of the test equipment.

b) Overheating : The pump shall operate at peak load conditions without objectionable heating of the bearings or of the prime mover. The operating pump speed shall be the speed at which the pumping unit would be expected to operate during a fire.

c) The engine shall not show signs of overload or stress and its governor shall properly regulate the speed.

d) Controllers:

The automatic controller shall be put through not less than ten automatic and ten manual operations.

A running interval of at least five minutes at full speed shall be allowed before repeating the starting cycle. Automatic operation of the controller shall start the pump from all the provided starting features, such as pressure switches, valves, etc. Length of Test. The pump shall be in operation not less than one hour (total time) during the foregoing tests.

2.1.7 Single Source Responsibility:

The pump, driver, and all controls and necessary attachments, specified herein, shall be purchased under a unit contract. The pump manufacturer shall assume unit responsibility and shall provide the services of a qualified CONSULTANT to supervise the installation and alignment of equipment.

Field tests shall be conducted in the field to satisfy the and Local Authorities having jurisdiction of satisfactory operation of pump, driver and controller. The pump manufacturer's CONSULTANT shall be at the job site, supervising the test. The control manufacturer shall have their representative at the job site to train operators in the use of the controls.

2.1.8 Spare Parts and Tools Spare parts and tools necessary for two years operation, as recommended by the manufacturer, shall be provided as a part of the contract for the engine. A list of these spares shall be included in the offer.

2.1.9 Automatic transfer switch:

Where both fire pumps are electric motor driven. Fire pump controller shall be provided with auto power transfer switch.

An automatic transfer switch to provide switching from normal power supply to emergency diesel generated power supply shall be provided as a self contained power switching assembly and housed either in a barriered protected compartment of the fire pump controller, or in a separate enclosure attached to the controller and marked "POWER TRANSFER SWITCH". The automatic transfer switch shall have a horsepower rating at least equal to the motor horsepower or rated at 115 percent of the motor full-load current, and be suitable for switching the motor locked rotor current. The switch shall be electrically operated, and mechanically held. A non electrical switch for safe manual operation of the automatic transfer shall be provided. An isolating switch as specified above, shall be provided in the transfer switch enclosure, ahead of the alternate input terminals of the transfer switch. The switch shall be supervised and operate an audible and visual signal in the pump room, to indicate when it is open. The isolating switch shall have a withstand rating not less than the available short-circuit current of the alternate power source. The automatic transfer switch shall be provided with under voltage sensing devices to monitor all ungrounded lines of the normal power source. When the voltage on any phase at the load terminals of the circuit breaker within the fire pump controller falls below 90 percent of the motor rated voltage, the transfer switch shall automatically initiate transfer to the alternative source. Sensing a phase reversal of the normal power source shall cause a simulated normal source power failure. Voltage and frequency sensing devices shall be provided to monitor at least one ungrounded line of the alternative power source, and transfer shall be inhibited until there is adequate voltage and frequency to serve the fire pump load. Two (2) visual indicators shall be provided for external indication of the status of the power source to which the fire pump controller is connected. A means shall be provided to delay retransfer from the alternate source of power to the main power supply until the normal source of power is stabilized. This time delay shall be automatically bypassed if the alternate source fails.

Means shall be provided to prevent higher than normal inrush currents transferring the fire pump motor from one electric power source to the other.

The alternate power source provided by the on-site emergency diesel generator shall incorporate the following provisions.

a.) The transfer switch shall not have integral short-circuit or overcurrent protection.

b.) A device to delay starting of the emergency diesel generator, to prevent nuisance starting in the event of momentary dips and interruptions of the normal source.

c.) A circuit loop to the emergency diesel generator whereby either the opening or closing of the circuit will start the emergency diesel generator when commanded by the automatic transfer switch.

d.) A means to prevent sending of the signal for starting the emergency diesel generator when commanded by the transfer switch, if the isolation switch on the alternate source side of the pump transfer switch is open.

The fire pump controller and transfer switch shall each have a cautionary marking to indicate that the isolation switch for both the controller and transfer switch is opened before servicing the controller, transfer switch or fire pump motor.

A momentary test switch, which is externally operable and will simulate a normal power source failure, shall be provided on the enclosure.

The fire pump controller and transfer switch shall each have short-circuit current withstand ratings at least equal to the available short-circuit currents for both the normal source power circuit and the alternate source power circuit.

PART 3 - EXECUTION

3.1 Examination

3.1.1 Examine areas, equipment foundations, and conditions with installer present for compliance with requirements for installation and other conditions affecting pump performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.1.2 Examine the installed fire fighting system, verify actual locations of piping and connections prior to testing and commissioning.

3.2 Concrete Equipment Bases

3.2.1 **I**nstall concrete equipment bases of dimensions required for fire pumps, and controllers.

3.3 Installation

3.3.1 Comply with pump manufacturers written installation and alignment instructions.

3.3.2 Install pumps in locations indicated and arrange to provide access for periodic maintenance, including removal of motors impellers, couplings and accessories.

3.3.3 Set base mounted pumps on concrete equipment bases as indicated on drawings. Disconnect couplings halves before setting. Do not reconnect couplings until alignment operations have been completed.

3.3.4 Support pump base plate on rectangular metal blocks and shims or on metal wedges having small taper, at points near foundation bolts to provide a gap of 19 to

38 mm between pump base and foundation for grouting.

3.3.5 Adjust metal supports or wedges until pump and driver shafts are level. Check couplings faces and pump suctions and discharge flanges to verify that they are level.

3.3.6 Install valves of types and at locations indicated that are same size as the piping connecting fie pump, bypasses, test headers and other piping systems.

3.3.7 Install pressure gages on pump suction and discharge in such a manner to be easily readable and completely isolated from vibrations.

3.3.8 Support pumps and piping separately so that weight of piping system does not rest on pumps.

3.3.9 Install piping accessories, hangers and supports, anchors, valves meters and gages, and equipment support as indicated for complete installation.

3.3.10 Install flow meter and sensing elements where indicated, install flow measuring system components and make connections according to manufacturers written installation instructions.

3.3.11 Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified as factory mounted. Furnish copy of manufacturers wiring diagram for submittal to the Consultant.

3.3.12 Verify that electrical wiring is installed according to manufacturer's recommendations and installation requirements. Do not proceed with equipment start up until wiring installation is acceptable.

3.4 Alignment

Align pump and driver shafts after complete unit has been leveled on foundation and after grout has set and foundation bolts have been tightened.

Once the alignment is correct, tighten foundation bolts evenly but not too firmly. Fill base plate completely with non shrink, non metallic grout, with metal blocks and shims or wedges in place. After grout has hardened, fully tighten foundation bolts. Check alignment and take corrective measures if required.

3.5 Connections

Connect suction and discharge side of the piping system to the pumps.

Connect flowmeasuring and other hydronic system components according to manufacturer's written installation instructions.

3.6 Field Quality Control

Contractor to ensure services of pump manufacturer representative to supervise

field assembly of components, installation of fire fighting pump units, including piping and electrical connections and field acceptance tests. Report test results in writing.

Check all connections for tightness.

Perform field acceptance tests for the pump unit (pump, driver and controller) and system piping when pump unit installation is complete. Where possible, field correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or that does not perform as specified and as indicated, then retest to demonstrate compliance. Verify that each pump unit performs as specified and as indicated.

3.7 Testing and Commissioning

3.7.1 General.

After completion of the Work, Contractor shall run a test over a sufficient period of time to prove the proper capacity and performance of all apparatus, etc., and the system as a whole.

The Contractor shall carry out commissioning and testing of all equipment installed.

Startup Services: Contractors shall provide services of pump manufacturer representative to provide startup service and to demonstrate and train owner's maintenance personnel as specified below:

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components. Review data in the Operating and Maintenance Manual.

Final Checks Before Startup: perform the following preventive maintenance operations and checks before startup wherever applicable :

Lubricate oil lubricated bearings.

Remove grease lubricated bearing covers and flush bearings with kerosene and thoroughly clean. Fill with new lubricant according to manufacturer's recommendations.

Disconnect coupling and check electric motor for proper rotation. Rotation shall match direction of rotation marked on pump casing. Check that the pump is free to rotate by hand. Do not operate the pump if it is bound or if it drags even slightly until cause of trouble is determined and corrected.

3.7.5 Starting procedure for pumps (open circuit):

Prime pump by opening suction valve and closing drains, and prepare pump for operation.

Open sealing liquid supply valve if pump is so fitted.

Start motor.

Open discharge valve slowly.

Observe leakage from stuffing boxes and adjust sealing liquid valve for proper flow to ensure lubrication of packing. Do not tighten gland immediately, but let packing run in before reducing leakage through stuffing boxes. Check general mechanical operation of pump and motor.

3.7.6 Commissioning shall be deemed to include all operations required in order to correctly set the plant to work, adjust and calibrate to design conditions to the complete satisfaction of the Consultant. The above shall include but not limited to testing and balancing of all fire fighting systems, including associated plant and equipment, balancing and adjusting to achieve correct flow rates, including setting valves and other regulating devices.

3.7.7 Final setting positions for all regulating and controlling devices shall be recorded and such records shall form part of the manual of the operating and maintenance instructions.

3.7.8 All systems shall be field tested and run on load, with all automatic controls in operation and all circuits balanced to produce design conditions, in presence and to the satisfaction of the Consultant.

3.7.9 In case of unsuccessful test run, the Contractor shall take necessary step for the rectification and retested to the satisfaction of the Consultant.

3.7.10 The Contractor shall also provide at his own cost services of skilled and unskilled staff during the test run of all the systems as required by the Consultant.

3.8 Training

3.8.1 Train owner’s maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

3.8.2 Schedule training with at least 7 days’ advance notice.

3.9 Spares

3.9.1 The tenderer shall include the cost of complete set of Fire pump Spares of all items required for latest three years of operation.

3.9.2 The cost of spare shall be included in the cost of pump.

3.9.3 The spares shall be recommended by the vender but shall include the following as minimum

Description	Qty
Inboard Bearing	1 Nos
Outboard Bearing	1 Nos
RH Shaft Sleeve and O-ring	1 Nos
LH Shaft Sleeve and O-ring	1 Nos
Case Rings	2 Nos
Packing	2 Nos
Mechanical Seal, if applicable	1 Nos
Casing Gasket	1 Nos
Pump Shaft	1 Nos
Impeller	1 Nos
Shaft Sleeves	1 Nos
Bearing and housing	1 Nos
Mechanical Seal or Packing and Glands/bolts.	1 Nos

END OF SECTION

Sect.15410 - PLUMBING FIXTURES

1.01 QUALITY ASSURANCE

A. Quality Standard: NSF 61 for fixture materials in contact with potable water.

1.02 WARRANTY

A. Materials and Workmanship:

1. Commercial Applications: One year.

1.03 FAUCETS

A. Lavatory Faucets, <Refer Architecture fixture selection and Specifications>:

1. Two-handle mixing non-pressure type valve.

a. Body Material: Commercial, solid brass (with non-metallic coatings or Chrome finish as required by the architect.
b. Finish: Polished chrome plate.
c. Maximum Flow Rate: Maximum [2.5 gpm (9.46 L/min.),
d. Mounting: [Deck, exposed] [Deck, concealed] [Back/wall, exposed] [Back/wall, concealed].
e. Spout: [Rigid, gooseneck] type.
f. Spout Outlet: Aerator/ Spray

B. Sink Faucets, <Refer Architecture fixture selection and Specifications>::

1. [Kitchen faucet with spray, three-hole fixture].

a. Body Material: [Commercial, solid brass] (with non-metallic coatings or Chrome finish as required by the architect).
b. Finish: Polished chrome plate]
c. Maximum Flow Rate: 2.5 gpm (9.46 L/min.), unless otherwise indicated.
d. Mixing Valve: Two-lever handle.
e. Backflow Protection Device for Hose Outlet: Not required.
f. Mounting: Deck, Back/wall as recommended by the architect.
g. Spout Outlet: Aerator/ Spray
h. Drain: Stopper with chain.

1.04 TOILET SEATS

A. Toilet Seats :

1. Toilet seat for water-closet-type fixture.

a. Material: Molded, solid plastic.
b. Configuration: front with cover.
c. Size: Regular.
d. Class: Standard commercial.

1.05 FIXTURE SUPPORTS

A. Water-Closet Supports :

1. Combination carrier designed for standard mounting height of wall-mounting, water-closet-type fixture.

B. Lavatory Supports:

1. Type [lavatory carrier with exposed arms and tie rods] or [lavatory carrier with concealed arms and tie rod] for wall-mounting, lavatory-type fixture.

C. Sink Supports:

1. Type [sink carrier with exposed arms and tie rods] or [II, sink carrier with hanger plate, bearing studs, and tie rod] for sink-type fixture.

1.06 WATER CLOSETS (WASTREN)

A. Water Closets, <Refer Architecture fixture selection and Specifications> :

1. Floor-mounting, floor-outlet, vitreous-china fixture designed for [gravity-type tank] operation.

a. Style: [Close coupled] [One piece].

1) Bowl Type: Round front design. Include bolt caps matching fixture.
2) Height: Standard.
3) Design Consumption: Dual Flush Design with Major (6.0 L/flush) Minor (4 L/flush)].
4) Tank: Gravity type. Include cover.

b. Supply: [NPS 3/8 (DN 10)] [NPS 1/2 (DN 15)] chrome-plated brass or copper with wheel-handle stop.
c. Toilet Seat: Included

1.07 WATER CLOSETS (EASTREN)

A. Squatting WC, <Refer Architecture fixture selection and Specifications> :

1. Flat Bowl, vitreous-china fixture designed for [gravity-type tank] operation.

1) Type: Flat and Shallow design
2) Flush Tank : Yes (check drawings for installation height)

3) Design Consumption: Single Flush Design with Major (6.0 L/flush).
4) Tank: Gravity type.
5) Color (Refer Architecture fixture selection and Specifications)

b. Supply: [NPS 1/2 (DN 15)] chrome-plated brass or copper with wheel-handle stop.

c. DN50 supply pipe from Flush tank to WC. Pipe shall be concealed.

END OF SECTION

Sect.15441 – PLUMBING PUMPS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02 SUBMITTALS

A. Product Data: For each type and size of domestic water pump specified. Include certified performance curves with operating points plotted on curves; and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For domestic water pumps to include in emergency, operation, and maintenance manuals.

1.03 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of domestic water pumps and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written rigging instructions for handling.

1.05 COORDINATION

A. Coordinate size and location of concrete bases.

PART 2 - PRODUCTS

2.01 BOOSTER AND TRANSFER PUMPS

A. Manufacturers:

1. Armstrong Pumps Inc.
2. Grundfos Pumps Corp.
3. Wilo Pumps
4. Refer Approved list of manufacturers

B. Description: Factory-assembled and -tested, Multistage stage

1. Supply and install transfer and Booster water Set designed for a total system capacity as shown on Pump Schedule. The systems shall be tested and calibrated, and shipped to the job site as an integral unit ready to receive suction and discharge piping and incoming power supply.

2. The unit shall be a packaged factory assembled and tested unit complete with duty/stand by pump, interconnecting pipework in copper, bronze, valves, safety devices and prewired control panel.

3. Pumps shall be constant speed:

4. Pump shall be bronze fitted centrifugal, single stage, end suction type

5. Pump shall be rated for a minimum of 175 PSIG working pressure.

6. Casings shall be cast iron with gauge ports, vent and drain ports at top and bottom of casing.

7. Shaft impeller shall be stainless steel 316.

8. The pumps shall be complete with temperature control, gate valves, check valves, pressure gauges, thermal bleed circuits, wiring, conduit and interconnecting pipe work, mounted on anti-vibration mountings and neatly arranged and firmly supported by the framework of the unit. Suction connection shall be horizontal, as close to the base as possible to connect to inlet pipe from the water storage tank.

9. Mechanical seals shall be with carbon rotating ring, stainless steel spring, ceramic seat and flexible bellows and gaskets. Grease lubricated ball type bearings shall be provided.

10. Pump and Motor Assembly: Hermetically sealed, replaceable type unit with motor and impeller on common shaft and designed for installation with pump and motor shaft mounted horizontally.

C. Capacities and Characteristics:

1. Capacity: Refer Equipment Schedule
2. Total Dynamic Head: Refer Equipment Schedule
3. Maximum Continuous Operating Temperature: 220 deg F (104 deg C).
4. Impeller Size: As per Manufacturer Recommendation
5. Inlet and Outlet Size: As per Manufacturer Recommendation
6. Speed: As per Manufacturer Recommendation
7. Motor Horsepower: Refer Schedule
8. Brand used for design selection : Grundfos

2.02 CONTROLS

1. The pump set control panel shall be in a NEMA I enclosure which includes motor starters, time delays, protected control circuit, transformer, current relays, hand-off-automatic switches for each pump, minimum run timers, and low suction pressure cut out etc.

2. Transfer pump shall be controlled by float switch.

2.03 SUMP PUMPS

1. Pump casing shall be Stainless steel.

2. Impeller shall be stainless steel wear resistant, semi shrouded, multi vane with adjustable diffusers. Minimum particle size shall be 20mm

3. Shaft shall be Stainless Steel 316SS.

4. Motor shall be squirrel cage induction type, class F insulation capable of a maximum of 15 starts/hour.

5. Motor casings shall be with integral cooling ribs for maximum heat dissipation.

6. Pumps shall be fitted with two mechanical seals with silicon carbide rotating & seat stainless steel spring, flexible bellows and gaskets. The chamber between the shaft seal to be oil filled.

7. Shaft shall be mounted on pregreased rolling element bearings.

8. Cable junction chamber shall be a sealed terminal chamber with separate gland assemblies incorporating strain relief clamps.

9. Pumps shall be suitable for a maximum depth of submersion with the flanged outlet directed vertical upwards.

10. Pumps shall be selected to match the duties indicated on drawings.

11. Pumps shall be supplied with control panel complete with integrated fuse elements, handoff automatic switch, motor contactor, duty pump selector switch, run/trip lamps for individual pumps etc. Pumps shall be controlled by a unit mounted float control. The pumps shall operate at high level and stop at low level of water in the sump pit.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

3.02 CONCRETE BASES

A. Install concrete bases of dimensions indicated for pumps and controllers.

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.03 PUMP INSTALLATION

A. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.

B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

3.04 CONNECTIONS

A. Install piping adjacent to pumps to allow service and maintenance.

B. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.

1. Install flexible connectors adjacent to pumps in suction and discharge piping of pumps:

2. Install shutoff valve and strainer on suction side of pumps, and check valve and throttling valve on discharge side of pumps
3. Install pressure gages at suction and discharge of pumps.

3.05 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Perform the following startup checks for each pump before starting:

    a. Verify bearing lubrication.
    b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
    c. Verify that pump is rotating in the correct direction.

5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
6. Start motor.
7. Open discharge valve slowly.
8. Adjust timer settings.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

END OF SECTION 15441

1885 SMI UNIVERSITY

Sindh Madressatul Islam University

DEVELOPMENT OF SINDH MADRESSATUL ISLAM UNIVERSITY (SMIU) CAMPUS AT EDUCATION CITY MALIR, KARACHI (GATE OFFICE & BOUNDARY WALL REMAINING WORKS)

Tender Document

Volume-III

Bill of Quantities

EA Consulting Pvt Ltd

ARCHITECTURE | ENGINEERING | PROJECT MANAGEMENT

PAKISTAN | UAE | CANADA

Head Office AL-9, 15th Lane, Khayban-e-Hilal, Phase-VII, DHA,Karachi-75500, Pakistan

UAN +92 21 111 111 584 | Fax: +92 21 3584 1825 | info@eaworld.com | www.eaworld.com

GATE OFFICE & BOUNDARY WALL (REMAINING WORKS)

S.No	Description	Amount
A	**PRELIMINARIES & GENERAL REQUIREMENTS**	***Included in Permanent works***
B	**PERMENANT Works**	
1	CIVIL WORKS (STRUCTURE)	
1	CIVIL WORKS (ARCHITECTURE)	
2	ELECTRICAL WORKS	
3	ELV WORKS	
4	PLUMBING WORKS	
5	HVAC WORKS	
6	BOUNDARY WALL (REMAINING WORKS)	
	TOTAL COST	

CIVIL WORK (STRUCTURE)

S.No	Description	Amount
A	**SCHEDULE ITEM**	
1	EARTH WORKS	478,263
2 (i)	SUB STRUCTURE (Concrete/RCC and steel works)	5,023,414
(ii)	SUB STRUCTURE (Excluding Concrete/RCC and steel works)	125,979
3	SUPER STRUCTURE (Concrete/RCC and steel works)	21,343,368
4	MASONRY WORKS	
5	THERMAL & MOISTURE PROTECTION	
6	METAL WORKS	
7	WOOD WORKS	
8	FLOOR FINISHES	
9	WALL FINISHES	
10	CEILING FINISHES	
11	EXTERNAL FINISHES (BUILDING)	
12	EXTERNAL FINISHES OTHER THAN BUILDING (NON COVERED AREA)	
	Schedule Items - A	**26,971,024**
	Add ____% Premium Above/Below/At PAR on (Concrete/RCC and steel works at S.No 2-(i) & 3)	
	Add ____% Premium Above/Below/AT PAR on all other items (Except S.NO-2 (i) & 3)	
	Total of Schedule Items - A	
B	**NON-SCHEDULE ITEM**	
1	EARTH WORKS	-
2	SUB STRUCTURE	-
3	SUPER STRUCTURE	-
4	MASONRY WORKS	
5	THERMAL & MOISTURE PROTECTION	
6	METAL WORKS	
7	WOOD WORKS	
8	FLOOR FINISHES	
9	WALL FINISHES	
10	CEILING FINISHES	
11	EXTERNAL FINISHES (BUILDING)	
12	EXTERNAL FINISHES OTHER THAN BUILDING (NON COVERED AREA)	
	Total of Non-Schedule Items - B	**-**
	TOTAL CARRIED TO GRAND SUMMARY (A+B)	

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
1	2	3	4	5	6	7 = 4 x 6
		SCHEDULE ITEMS				
1		**EARTH WORKS**				
1.1	Code -103,	Excavation for raft foundations, underground tanks, septic tanks (rectangular or square) in **gravelly soil** and back filling the excavated material all round the trenches including breaking clods, watering, consolidation by ramming in layers not exceeding 9 inches (229 mm) in depth to full compaction, dressing and disposal of surplus excavated stuff as directed, lead up to one chain (30.5 R.m) and lift upto 5 feet (1.52 m).etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 11	From ± 0'-0" to -5' - 0"	665 Cft	100 Cft	1,566.56	10,418
	Item # 11+28	From -5' - 0" to -8' - 0"	120 Cft	100 Cft	1,804.06	2,165
1.2	Code -103,	Excavation for raft foundations, underground tanks and septic tanks (rectangular or square) in **soft of disintegrated rock** by hammering and chiselling, and jumper work including stacking of serviceable and unserviceable materials separately, lead upto one chain (30.5 R.m) and lift up to 5 feet (1.52 m). etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 16	From ± 0'-0" to -5' - 0"	1330 Cft	100 Cft	3,033.25	40,342
	Item # 16+29	From -5' - 0" to -8' - 0"	240 Cft	100 Cft	3,330.13	7,992
1.3	Code -103,	Excavation for raft foundations underground tanks and septic tanks (rectangular or square) in **hard rock** by hammering, chiselling, and jumper work including stacking of serviceable and unserviceable materials separately, lead up to one chain (30.5 Ru.m) and lift up to 5 feet (1.52 m). etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 17	From ± 0'-0" to -5' - 0"	4660 Cft	100 Cft	4,434.88	206,665
	Item # 17+29	From -5' - 0" to -8' - 0"	830 Cft	100 Cft	4,731.76	39,274
1.4	Code -104 Item #8	Supplying **earth from approved outside sources** within a radius of 5 miles (8 km) including digging, loading and unloading and filling in foundation trenches, plinth or under floor, etc. including breaking clods, dressing, watering and consolidation by ramming in layers not exceeding 9 inches (229 mm) in depth to full compaction complete within a ;lead of one chain (30.5 R.m) and lift of 5 feet (1.52 m). etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.	3780 Cft	100 Cft	3,254.05	123,003

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
1.5	Code -117 Item #1	Providing and laying **soling stones 6 inches to 9 inches (152 mm to 229 mm) size** under floors including packing with spawls and chips and consolidating etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.	630 Cft	100 Cft	7,683.13	48,404
		Total Carried to Summary				**478,263**

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
2		**SUB STRUCTURE** ***Note: All RCC Concrete will be used only Ready mixed.***				
		CONCRETE WORKS				
2.1	Code -106	Providing and laying in situ **1:4:8** (1 cement 4 sand and 8 coarse aggregate) cement concrete using crushed graded boulders 3/4 inch (19 mm) and down gauge in foundation, basement and plinth including form work, compacting, curing and removal of form work etc. complete, foundation and basement up to 5 feet (1.52 m) depth and plinth up to 4 feet (1.2 m) height from ground level. etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 11	Below plinth beam,situ,walls,tanks, over stone soling or where required **(Cylindrical Strength 1280 Psi equal to Cubical strength 1600 Psi)**	710 Cft	100 Cft	32,221.55	228,773
2.2	Code -106	Providing and laying in situ **1:3:6** (1 cement 3 sand and 6 coarse aggregate) cement concrete using crushed graded boulders 3/4 inch (19 mm) and down gauge in foundation, basement and plinth including form work, compacting, curing and removal of form work etc. complete, foundation and basement up to 5 feet (1.52 m) depth and plinth up to 4 feet (1.2 m) height from ground level etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 12	For Cast in situ / mass concrete or where required **(Cylindrical Strength 1600 Psi equal to Cubical strength 2000 Psi)**	445 Cft	100 Cft	34,857.58	155,116
		REINFORCED CONCRETE WORKS				
2.3	Code -114	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of **3750 lbs. per sq. inch** (23.24 N/mm2 at 28 days) with a mix not leaner than **1:1-1/2:3** in column footing of required shape including form work and its removal, compacting and curing etc. complete but excluding the cost of reinforcement, in foundation basement and plinth etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 1+137	Foundation for any type **(Cylindrical Strength 3000 Psi equal to Cubical strength 3750 Psi)**	1545 Cft	100 Cft	38,067.52	588,143
		Total Carried to Collection				**972,032**

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
2.4	Code -114 Item # 4+137	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of **3750 lbs. per sq. inch** (23.24 N/mm2 at 28 days) with a mix not leaner than **1:1-1/2:3** in columns of square or rectangular shape of regular section including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, in foundation basement and plinth. etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. Columns upto plinth **(Cylindrical Strength 3000 Psi equal to Cubical strength 3750 Psi)**	1410 Cft	100 Cft	41,889.37	590,640
2.5	Code -114 Item # 8+137	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of **3750 lbs. per sq. inch** (23.24 N /mm 2 at 28 days) with a mix not leaner than **1:1-1/2:3** in plinth beams of required shape and design including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, foundation basement and plinth etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. Plinth Beams i/c nibs / projections **(Cylindrical Strength 3000 Psi equal to Cubical strength 3750 Psi)**	485 Cft	100 Cft	40,334.02	195,620
2.6	Code -114 Item # 166	Providing and laying hard grade ribbed deformed **(minimum yield point 60,000 psi or 414 Mpa)** reinforcement bars with & including the cost of straightening, cutting, bending, binding, wastage, and such overlaps as are not shown in the drawings, placing in position on cement concrete 1:2:4 precast or Ms. chairs, tying with binding wire, cost of chairs and wires etc. in all kinds of RCC work in foundation, basement, plinth and ground floor of building including septic tanks and under ground tanks and in projections for future extension.etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. **(Bars to be cut and placed in position at any level according to the Bar bending schedule prepared by the contractor and approved by the Engineer).**	11560 Kg	Kg	282.45	3,265,122
2.7	Code -108 Item # 12	Providing a coat of **bitumen emulsion at 10 Lbs. per % sft. (0.49 Kg/sm**) on walls and floor in ground floor etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.	4910 Sft	100 Sft	1,010.75	49,628
2.8	Code -124 Item # 199	Providing and carrying out **Termite proofing** in foundations, under floos and wood work surface with a soloution using of confront TC with water and spraying the solution of the area to be treated etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.	5815 Sft	Sft	13.13	76,351
Total Carried to Collection						**4,177,361**

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
		COLLECTION				
		Page No -3				972,032
		Total from Page-4				4,051,382
		Total Carried to Summary (Concrete/RCC and steel works)				**5,023,414**
		Total Carried to Summary (Excluding Concrete/RCC and steel works)				**125,979**

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
3		**SUPER STRUCTURE** **Note: All RCC Concrete will be used only Ready mixed.**				
		REINFORCED CONCRETE WORKS				
3.1	Code -114	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of **3750 lbs. per sq. inch** (23.24 N/mm2 at 28 days) with a mix not leaner than **1:1-1/2:3** in columns of square or rectangular shape of regular section including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, in the ground floor etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. Columns **(Cylindrical Strength 3000 Psi equal to Cubical strength 3750 Psi)**				
	Item # 24+137	Upto 15'-0" Height	2185 Cft	100 Cft	52,667.42	1,150,783
	Item # 24+137+92	Above +15'-0" Height	1800 Cft	100 Cft	55,478.88	998,620
3.2	Code -114	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of **3750 lbs. per sq. inch** (23.24 N /mm 2 at 28 days) with a mix not leaner than **1:1-1/2:3** in straight beams lintels cantilever beams of required shape or section including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, in basement and ground floor etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. Beams /Arches/ purdi / bracing / lintels / nibs / sills / coping / parapet wall /bands/around opening and projections **(Cylindrical Strength 3000 Psi equal to Cubical strength 3750 Psi)**				
	Item # 38+137	Upto 15'-0" Height	1060 Cft	100 Cft	47,291.64	501,291
	Item # 38+137+92	Above +15'-0" Height	6270 Cft	100 Cft	50,103.10	3,141,464
3.3	Code -114	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of **3750 lbs. per sq. inch** (23.24 N /mm 2 at 28 days) with a mix not leaner than **1:1-1/2:3** in ordinary slab more than 6 inches (152 mm) thick including form work and its removal compacting and curing etc. complete but excluding the cost of reinforcement, in basement and ground floor etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. Slab i/c projections **(Cylindrical Strength 3000 Psi equal to Cubical strength 3750 Psi)**				
	Item # 57+137	Upto 15'-0" Height	400 Cft	100 Cft	43,685.39	174,742
	Item # 57+137+92	Above +15'-0" Height	0 Cft	100 Cft	46,496.85	-
		Total Carried to Collection				***5,966,900***

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
3.4	Code -114	Providing and laying hard grade ribbed deformed **(minimum yield point 60,000 psi or 414 Mpa)** reinforcement bars with & including the cost of straightening, cutting, bending, binding, wastage, and such overlaps as are not shown in the drawings, placing in position on cement concrete 1:2:4 precast or Ms. chairs, tying with binding wire, cost of chairs and wires etc. in all kinds of RCC work in foundation, basement, plinth and ground floor of building including septic tanks and under ground tanks and in projections for future extension.etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. **(Bars to be cut and placed in position at any level according to the Bar bending schedule prepared by the contractor and approved by the Engineer).**				
	Item # 166	Upto 15'-0" Height	16665 Kg	Kg	282.45	4,707,029
	Item # 166+174	Above +15'-0" Height	37190 Kg	Kg	286.89	10,669,439
Total Carried to Collection						**15,376,468**
		COLLECTION				
		Page No -6				5,966,900
		Total from this Page				15,376,468
Total Carried to Summary						**21,343,368**

CIVIL WORK (ARCHITECTURE)

BILL OF QUANTITIES

S.No	Description	Amount
A	**SCHEDULE ITEM**	
1	EARTH WORKS	-
2	SUB STRUCTURE	-
3	SUPER STRUCTURE	-
4	MASONRY WORKS	358,254
5	ROOF SCREEDING	61,690
6	METAL WORKS	585,649
7	WOOD WORKS	93,147
8	FLOOR FINISHES	366,177
9	WALL FINISHES	344,802
10	CEILING FINISHES	43,542
11	EXTERNAL FINISHES (BUILDING)	4,093,341
	Total of Schedule Items - A	***5,946,602***
	Add ____% Premium on (MS Steel Woks Sr:No. 6.04)	
	Add ____% Premium on all items otherthan (MS Steel Woks Sr:No 6.04 & 6.05)	
	Total Schedule Items - A (Including Premium)	
B	**NON-SCHEDULE ITEM**	
1	EARTH WORKS	
2	SUB STRUCTURE	
3	SUPER STRUCTURE	
4	MASONRY WORKS	N/A
5	ROOF SCREEDING	N/A
6	METAL WORKS	
7	WOOD WORKS	
8	FLOOR FINISHES	
9	WALL FINISHES	
10	CEILING FINISHES	
11	EXTERNAL FINISHES (BUILDING)	
	Total of Non-Schedule Items - B	
	TOTAL CARRIED TO GRAND SUMMARY (A+B)	

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
4		**DPC & MASONRY WORKS**				
		Damp Proof Course (DPC)				
4.01	Code -108 Item # 3	Providing and laying 2 inches (51 mm) thick damp proof course with cement concrete 1:2:4 cast in situ using graded screened bajri of 3/4 inch (19 mm) and down gauge mixed with any approved water proofing agent including compacting, curing form work and its removal etc. complete, but excluding the cost of water proofing agent .etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer. 2" thick DPC	75 Sft	100 Sft	5,555.26	4,166
		Water Proofing Agent				
4.02	Code -108 Item # 5	Extra for using water proofing agent pudlo in item Nos. 4.01 (quantity to be used as per manufacturer's specification/2.50Kg per 100Sft).etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	12 Kg	Kg	179.24	2,183
		Solid Block Masonry				
4.03	Code-110	Providing and laying 1:3:6 machine made cement concrete solid block masonry 4 to 6 inches (102 mm to 152 mm) thick using graded screened bajri 3/4 inch (19 mm) and down gauge set in 1:4 cement mortar including scaffolding, raking out joints and curing etc. complete in ground floor superstructure.				
	Item # 44+77+92	Ground Floor Upto 15 Feet Height	595 Cft	100 Cft	34,620.71	205,993
	Item # 44+77+92+70	Above 15 Feet Height	400 Cft	100 Cft	36,477.89	145,912
		Total Carried to Summary				**358,254**
5		**Roof Screeding**				
5.01	Code-117 Item # 6+26	Providing and laying floors of 2 inches (51 mm) thick 1:2:4 cement concrete using graded screened bajri 3/4 inch (19 mm) and down gauge in ground floor laid in panels including form work, consolidation, finishing, and curing etc. complete.	810 Sft	100 Sft	7,616.02	61,690
		Total Carried to Summary				**61,690**
6		**METAL WORKS**				
		Aluminium Openable Windows				
6.01	Code -119 Item # 70	Providing and fixing fully glazed Bronz anodized or Powder Coated aluminium Sliding/openable windows as per British standard manufactured by Lucky, Alcop, Krudson, Pakistan Cables and A.C.P. (fixing through their approved fabricators), Executive model section double or single glazed 101mm x 37mm and 2mm thick including the cost of aluminium netting, fitting, with all accessories cutting hole etc. and making good damages to walls etc. complete as required in any floor as per direction of engineer-in-charge, but excluding the cost of glass pans.	50 Sft	Sft	1,742.19	87,110
		Aluminium Fixed Windows				
6.02	Code -119 Item # 61	Providing and fixing fully glazed Bronz anodized or powder coated aluminium Fixed windows Partition as per British standard manufactured by Lucky, Alcop, Krudson, Pakistan cable and A.C.P. (fixing through their approved fabricators) deluxe model box section 101.76mm x 44.50mm and 2mm thick including the cost of aluminium fittings, with all accessories cutting hole etc. and making good damages to walls etc. complete as required in any floor as per direction of engineer-in-charge, but excluding the cost of glass pans.	200 Sft	Sft	847.22	169,444
		Plain Glass				
6.03	Code -119 Item # 120	Providing and fixing plain glass panes 5mm thick to M.S. Box pipe / Aluminium doors, windows and ventilators etc. including the cost of labour but excluding the cost of M.S. square pipe beading, rubber packing and screw in any floor at any height.	335 Sft	Sft	297.02	99,502
		MS Grill				

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
6.04	Code -119 Item # 34	Providing and fixing M. S. square bars at required spacing with horizontal flat iron as per approved design including making holes fixing with sunk iron screws, painting two coats of red oxide paint etc. complete as required in any floor.	485 Kg	Kg	325.06	157,654
		Painting on iron work				
6.05	Code -122 Item # 174	Painting on iron work with Synthetic enamel paint of approved make and shade by spray machine two coats over and including the cost of one priming coat complete at any height in any floor .	894 Sft	100 Sft	8,046.88	71,939
		Total Carried to Summary				**585,649**
7		**WOOD WORKS**				
		Wooden Cabinet				
7.01	Cod-124 Item # 210	Proving & fixing kitchen floor cabinet making of shutter board box & 3/4" thick high glass lamination lasani shutter , PVC beading , deodar wooden frame 2.5"x1.25" size making tray drawer of approved design etc. fixed with rawal plugs,screws i/c the cost of glue iron nails hings, handles etcas per drawing. complet the as per direction of engineer incharge.	60 Sft	Sft	1,552.45	93,147
		Total Carried to Summary				**93,147**
8		**FLOOR FINISHES**				
		Levelling Screed				
8.01	Code-117 Item # 3	Providing and laying 1:5:10 cement concrete bed under floors using graded stone ballast 2 inches (51 mm) and down gauge with levelling, ramming, watering and curing etc. complete..	150 Cft	100 Cft	20,118.77	30,178
		Ceramic Tiles				
8.02	Code-117 Item # 82	Providing and laying floor of 6mm (approx: 1/4") thick coloured glazed tiles 12" x 12" (304mm x 304mm) of master make (Pakistani) first grade in ground floor laid over 1" (25mm) thick cement mortar 1:2 (1 cement and 2 sand) including jointing and washing the tiles with white cement slurry a matching colour (by using pigment in white cement) and curing etc. complete.	66 Sft	100 Sft	30,212.46	19,940
		Vetrified Porcelain Tiles				
8.03	Code-117 Item # 179	Providing and laying light colour, glazed/non skid **vitrified porcelean tiles (Polished)** not exceeding **1600 Sqcm each**, (Pak made) on walls and floors, in any floor, laid with dry bond (stile bond) over a base of 1" thick cement mortar (1:3) including jointing to tiles with joint filler of approved quality as per direction of the Engineer incharge.	530 Sft	100 Sft	36,016.99	190,890
		Counter Top				
8.04	Code-117 Item # 60	Providing and laying floor of 1 inch (25 mm) marble tiles above 7 Sq.ft. upto 16 Sq.ft. size (above 0.65 Sq.m upto 1.48 Sq.m) fine dressed on the surface without winding in ground floor over 1 inch (25 mm) lime mortar 1:2 (one lime two sand) setting the marble tiles with grey cement slurry over lime mortar jointing and washing the tiles with white cement slurry including curing, rubbing and polishing etc. complete, including the cost of mortar.	100 Sft	100 Sft	125,168.50	125,169
		Total Carried to Summary				**366,177**

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
9		**WALL FINISHES**				
		Internal Wall Plaster				
9.01	Code-122 Item # 6	1/2" (13 mm) thick **cement plaster** 1:6 on wall columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, grooves as specified and curing etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	2250 Sft	100 Sft	4,034.92	90,786
		Emulsion Paint				
9.02	Code-122 Item # 171	Painting with **(Dulux Emulsion paint)** of approved shade two coats over and including the cost of one priming coat, at any height in any floor. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	1570 Sft	100 Sft	6,553.63	102,892
		Enamel Paint				
9.03	Code-122 Item # 173	Painting on plastered surface with **Enamel paint** of approved make and shade by spray machine two coats over and including the cost of one priming coat, at any height in any floor. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	340 Sft	100 Sft	10,598.28	36,034
		Vetrified Porcelain Tiles (Dado/Skirting)				
9.04	Code-117 Item # 179	Providing and laying light colour, glazed/non skid **vitrified porcelean tiles** (Polished) not exceeding **1600 Sqcm each**, (Pak made) on walls and floors, in any floor, laid with dry bond (stile bond) over a base of 1" thick cement mortar (1:3) including jointing to tiles with joint filler of approved quality as per direction of the Engineer incharge.	135 Sft	100 Sft	36,016.99	48,623
		Ceramic Tiles (Dado/Skirting)				
9.05	Code-117 Item # 82	Providing and laying in floor/wall of 6mm (approx: 1/4") thick coloured **glazed tiles 12" x 12" (304mm x 304mm)** of master make (Pakistani) first grade in ground floor laid over 1" (25mm) thick cement mortar 1:2 (1 cement and 2 sand) including jointing and washing the tiles with white cement slurry a matching colour (by using pigment in white cement) and curing etc. complete	220 Sft	100 Sft	30,212.46	66,467
		Total Carried to Summary				**344,802.00**
10		**CEILING FINISHES**				
		Internal Ceiling Plaster				
10.01	Code-122 Item # 02	1/4" (6.4 mm) thick cement plaster 1:4 on soffits of ceiling, cantilever slabs, sides and soffits of beams etc, in basement, mezzanine and ground floor including making edges, corners and curing etc, Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	600 Sft	100 Sft	3,852.59	23,116
		Vinyl Distemper				
10.02	Code-122 Item # 151	Distempering with vinyl distemper (ICI) Deluxe Paintex of approved make and shade in two coats over and including the cost of one priming coat of lime wash including sand papering, dusting, and filling the holes, cracks and inequalities, if any, at any height in any floor. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	600 Sft	100 Sft	3,404.25	20,426
		Total Carried to Summary				**43,542**
11		**EXTERNAL FINISHES**				
		Roughcast Plaster				
11.01	Code-122	Providing and applying 3/4" (19 mm) thick rough cast cement rendering consisting of 3/8" or 9.6 mm topping of 1:2 (one cement and two mixed graded bajri 3/8" or 9.5 mm and down gauge) and base of 3/8" or 9.5 mm thick rough plaster 1:4 (one cement four sand) in plinth and ground floor including finishing etc. complete.				
	Item # 22	Ground (Upto 15 feet Height)	3900 Sft	100 Sft	6,709.56	261,673
	Item # 22+88	Ground (Above 15 feet Height)	9800 Sft	100 Sft	7,119.56	697,717
		External Plain Plaster				

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
11.02	Code-122	3/4" (19 mm) thick cement plaster (Plain) 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, grooves as specified and curing etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item # 8	Ground (Upto 15 feet Height)	970 Sft	100 Sft	5,335.06	51,750
	Item # 8+88	Ground (Above 15 feet Height)	2450 Sft	100 Sft	5,745.06	140,754
		Colour Crete				
11.03	Code-122	Providing and applying **colour Crete** 1/4" (6.4 mm) 1:1:2 (1 white cement mixed with pigment, 1 marble powder and 2 marble chips zero No.) with horizontal & vertical joints or Grooves including dragging the surface with wire brush complete with curing etc., over base of 3/4" (19 mm) thick cement plaster 1:3 in plinth, mezzanine and ground floor including chiseling the surface to give texture of stone including the cost of base course etc. complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item # 79+83	Ground (Upto 15 feet Height)	3900 Sft	100 Sft	19,962.50	778,538
	Item # 79+83+88	Ground (Above 15 feet Height)	9800 Sft	100 Sft	20,372.50	1,996,505
		Colour Pigment				
11.04	Code-122 Item # 82	Extra for providing and using pigment of required colour over item No. 11.02	21 Kg	Kg	744.06	15,625
		Weather Shield Paint				
11.05	Code-122 Item # 172	Painting three coats with **weather shield paint deluxe (ICI)** make of approved shade on plaster surface (External) and including the cost of cleaning the surface, sand papering etc. complete at any height in any floor etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	3420 Cft	100 Sft	4,408.75	150,779
Total Carried to Summary						**4,093,341**

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
		NON-SCHEDULE ITEMS				
4		**DPC & MASONRY WORKS**				
		Total Carried to Summary				N/A
5		**Roof Screeding**				
		Total Carried to Summary				N/A
6		**METAL WORKS**				
		Aluminium Door				
6.01	N.S.I	Providing, fabricating and fixing Bronz anodized or Powder Coated partly glazed, partly aluminium sheet infill and fully aluminium sheet infill swing doors comprising of deluxe model section, 101.6mm x 44.5mm x 2mm thick frame, 65mm x 40mm x 1.6mm thick shutter frame with aluminum sheet infill including 3nos ghinges, 2 nos tower bolts 6" long, 1set lever handle, 1no lock using aluminum fittings, with all accessories cutting hole etc, and making good damages to walls etc, complete as required in any floor as per direction of engineer-in-charge.				
	a)	Fully Aluminium Sheet infill Swing Door	35 Sft	Sft		
	b)	Partly Glazed Aluminium Sheet infill Swing Door excluding cost of glass pans.	85 Sft	Sft		
		Total Carried to Summary				
7		**WOOD WORKS**				
		Total Carried to Summary				N/A
8		**FLOOR FINISHES**				
		Total Carried to Summary				N/A
9		**WALL FINISHES**				
		Total Carried to Summary				N/A
10		**CEILING FINISHES**				
		Total Carried to Summary				N/A
11		**EXTERNAL FINISHES**				
		MS Lettering LOGO				
11.01	N.S.I	Providing, making, finish & fixing capital lettering "SINDH MADRESSATUL ISLAM UNIVERSITY" with backlight arrangement on top of arch/+32'-0" height, comprising of 300mm x 450mm high x 50mm wide each capital letter with approved powder coated MS tube fixed on top of wall with approved & required hardware including drilling, grouting, scaffolding/arrangement etc, making good complete in all respect, as per drawing, standard, specification and as directed by the Engineer.	2 Job	Job		
11.02	N.S.I	Providing, making, welding & fixing in position LOGO 8'-0 x 8'-0" with backlight arrangement on top of arch/+25'-0" height, comprising approved MS steel structure with exposed hollow tube including powder coating, 12mm thick cement board, 12mm thick white Acrylic sheet, approved colour Vinyl with printing LOGO, lettering & stablished year **"SINDH MADRESSATUL ISLAM UNIVERSITY 1985"** including drilling, required hardware, scaffolding/arrangement etc, making good complete in all respect, as per drawing, standard, specification and as directed by the Engineer.	2 Job	Job		
		MS Gate				

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Rate (RS)	Amount (RS)
11.01	N.S.I	Providing and fixing steel gate of MS tube & other steel sections of approved design with or without M.S. sheet covering including hold fast, with or without rollers and track arrangement including providing wicket shutter of required size with all accessories and locking arrangement complete as per direction of the Engineer-in-Charge.	652 Sft	Sft		
Total Carried to Summary						

GATE OFFICE
ELECTRICAL WORKS

BILL OF QUANTITIES
SUMMARY OF COST

S. NO.	DESCRIPTION	TOTAL AMOUNT IN PAK RUPEES
A	**SCHEDULE ITEMS**	
1	SINGLE PVC INSULATED WIRE IN EXISTING CONDUIT	9,140
2	3 WIRE IN PVC RECESSED CONDUIT	695,150
	Total of Schedule Items	**704,290**
	Add ___% Premium on Electrical Works of PWD-2022	
	Total of Schedule Items with Premium - A	
B	**NON-SCHEDULE ITEMS**	
1	LOW VOLTAGE CABLES AND WIRES	
2	DISTRIBUTION BOARD	
3	CONDUITS & PIPES	
4	WIRING ACCESSORIES	
5	LIGHT FIXTURES & FANS	
6	UPS SYSTEM	
7	LIGHTNING PROTECTION SYSTEM (LPS)	
	Total of Non-Schedule Items - B	
	TOTAL AMOUNT (A+B)	

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
		SCHEDULE ITEMS				
1	2-26	**SINGLE PVC INSULATED WIRE IN EXISTING CONDUIT**				
a)	2-26-05	Supply & drawing of 10 mm², single core, PVC insulated wire in all kinds of existing or given conduit/cable duct as required.	20	P/Meter	457	9,140
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				**9,140**
2	2-34	**3 WIRE IN PVC RECESSED CONDUIT**				
a)	2-34-02	Wiring for sub-main with 3x 2.5 mm², PVC insulated wire 300/500 volts grade, single core, stranded copper conductor wire in 20 mm (3/4")dia uPVC conduit recessed in the wall, column and roof etc as required. (DB to switch board including wiring between switch on the same circuit)	400	P/Meter	510	204,000
b)	2-34-01	Wiring for sub-main with 3x 1.5 mm², PVC insulated wire 300/500 volts grade, single core, stranded copper conductor wire in 20 mm (3/4")dia uPVC conduit recessed in the wall, column and roof etc as required. (Light point from switch board to point and point to point)	250	P/Meter	363	90,750
c)	2-34-03	Wiring for sub-main with 3x 4 mm², PVC insulated wire 300/500 volts grade, single core, stranded copper conductor wire in 20 mm (3/4")dia uPVC conduit recessed in the wall, column and roof etc as required. (DB to first outlet and outlet to outlet)	560	P/Meter	715	400,400
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				**695,150**

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
		NON-SCHEDULE ITEMS				
1		**LOW VOLTAGE CABLES AND WIRES**				
1.1		Supply, laying, testing, termination and commissioning of following size of multi core / single core, Cu/PVC, Cu/PVC/PVC, unarmoured, 0.6 kV/1 kV, 450/750V or 300/500V voltage grade copper cable in already laid raceways including all accessories lugs, cable gland etc. as per drawings and specification, complete in all respect.				
a)		**2 Core, Cu/PVC/PVC Cable (600/1000V)**				
i		2 Core - 10 Sq.mm Cu/PVC/PVC Cable	20	Rm.		
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				
2		**DISTRIBUTION BOARD**				
2.1		Supply, installation, testing & commissioning of Wall/Flush mounted Distribution Board (DB), made with 16 SWG sheet steel metal, as per single line diagram, dust protected, vermin proof housing coated with approved color having all the necessary switching & protections, including all mounting accessories as per specifications and drawings, complete in all respect.				
i		DB-GO	1	No.		
2.2		Supply, installation, testing and commissioning of following Isolators, including all mounting accessories as per specification and drawing, complete in all respect.				
i		20A, SPN Isolator Weatherproof type	3	No.		
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
3		**CONDUITS & PIPES**				
3.1		Providing and laying of following size (inner dia) PVC / UPVC Conduit as race ways with all accessories recessed / surface on wall / column / under floor for Power. As per specifications and drawings, complete in all respect.				
i		25 mm dia PVC	30	Rm.		
ii		38 mm dia PVC	30	Rm.		
iii		50 mm dia PVC	30	Rm.		
3.2		Providing and laying of UPVC (Class-D) pipe having dia of following size. Buried in ground as per drawing. Including excavation for laying of pipe and backfilling with clean sand (under and above pipe), compaction, concrete, plugging of pipe ends etc. as shown on drawing complete in all respect.				
i		4x50 mm dia uPVC Pipe (Class-D)	100	Rm.		
ii		4x50 mm dia uPVC Pipe (Class-D) Road Crossing Sleeves	60	Rm.		
iii		2x50 mm dia uPVC Pipe (Class-D)	30	Rm.		
iv		50 mm dia uPVC Pipe (Class-D)	30	Rm.		
3.3		Providing and Construction of Manhole Size 600x600x900 mm deep, 6" thick, concrete 1:2:4 ratio with 600mm round heavy duty cast iron cover, 100% water proof, complete in all respect.	3	No.		
3.4		Providing & installing of Pull Box as per drawing and specification,complete in all respect.	3	No.		

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				
4		**WIRING ACCESSORIES**				
4.1		Supply, installation, testing & commissioning of following 10/13/15/20A, gang type switches, Dimmer Switches, Sockets including 16 SWG Sheet Steel powder coated back Boxes with earth terminal, recessed in wall / column with all accessories as per specification, complete in all respects.				
i		10A, One Gang Switch	2	No.		
ii		10A, Two Gang Switch	4	No.		
iii		10A, Three Gang Switch	1	No.		
iv		10A, Four Gang Switch	2	No.		
v		One Gang Dimmer with 10A Switch	4	No.		
vi		10A, 2-Pin 1-Gang Switched Socket Outlet	24	No.		
vii		15A, 3-Pin Switched Socket Outlet	1	No.		
viii		32A, 5-Pin Three Phase Industrial Socket with Plug top	2	No.		
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				
5		**LIGHT FIXTURES & FANS**				
5.1		Supply, installation, testing & commissioning of following light fixtures complete with starters, Electronic ballast (unless mention otherwise), lamps, lamp holders, drivers, mounting accessories etc., as per specification, complete in all respects. Lighting fixtures sample must be submitted to consultant for approval. Note: Refer light fixtures drawings for complete light fixtures details.				
i		Surface / Ceiling mounted LED Downlight Fixture (IP-44) with 12W LED lamp	2	No.		
ii		Surface / Ceiling mounted Decorative type LED Downlight Fixture (IP-20) with PMMA Diffuser with 12W LED lamp	20	No.		
iii		Ceiling / Recessed mounted LED Downlight Fixture (IP-20) with Metal Housing, PC Light Diffuser and 18W LED lamp	14	No.		
iv		Wall / Surface mounted LED Flood Light Fixture (IP-66) with Die Cast Aluminium housing, PC Diffuser and 100W LED lamp	28	No.		
5.2		Supply, installation, testing and commissioning of following items including all connecting accessories, as per drawings & specifications, complete in all respects.				
i		56" dia Sweep Ceiling Fan	4	No.		
ii		8" dia Exhaust Fan	2	No.		

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				
6		**UPS SYSTEM**				
6.1		Providing, installing, testing and commissioning of True Online Double Conversion UPS rating 5 kVA Single Phase In, Single Phase Out, minimum 0.9 output power factor with 10 minutes battery backup, batteries with related DC cables from UPS to batteries, external By-pass and all accessories as per specification & drawings, complete in all respect.	1	No.		
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				
7		**LIGHTNING PROTECTION SYSTEM (LPS)**				
7.1		Supply, installation, testing and commissioning of 27mm x 2mm Tinned Copper Tape to be run on roof, on the elevation of the building and test clamp to earth pit, as required and shown on drawings including all fixing accessories etc.,as per specification, as per site requirement necessary for the functioning of the system and drawing, complete in all respect.	95	Rm.		
7.2		Supply, installation, testing and commissioning of Early Streamer Emission(ESE) Air Terminal mounted on 2 meter elevation mast, as per drawing, complete in all respect and having following specifications: Efficiency: 60 micro seconds Lightning current withstanding test (10/350µs): 100kA ESE Central Rod: Nickel Plated Copper Metal Housing : Stainless Steel 316L Protection Radius : 42-49 meter radius	1	No.		
7.3		Providing and installation of 2 meter high elevation mast consisting side wall mounting bracket for installation and fixing of ESE Air Terminal, as per drawing and specification as per site requirement necessary for the system, complete in all respect.	1	No.		
7.4		Providing and installation of pyramid holdfasts / studs filled with cement for holding and supporting the flat tape conductor, as per drawing and specification as per site requirement necessary for the system, complete in all respect.	47	No.		
7.5		Providing and installation of lightning flash counter as per drawing and specification as per site requirement necessary for the system, complete in all respect.	1	No.		

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
7.6		Supply, installation, testing and commissioning of Earth pit with Rod type earth electrode, 3/4" dia and 9 Ft. long copper bonded rod to achieve the earthing resistivity as mentioned in drawings including Bentonite chemical, other all required materials and connecting accessories, boring, labor, tools, transportation etc., as per drawings and specifications, complete in all respects.	6	No.		
7.7		Providing and installation of Test Clamp and Guard Tube 2 m in length, as per drawing and specification, as per specification,as per site requirement necessary for the functioning of the system, complete in all respect.	2	Job		
		CARRIED TO ELECTRICAL SUMMARY =====>>>>				

GATE OFFICE
ELV WORKS

BILL OF QUANTITIES
SUMMARY OF COST

S. NO.	DESCRIPTION	TOTAL AMOUNT IN PAK RUPEES
A	**SCHEDULE ITEMS**	
1	CCTV CAMERAS	1,701,012
	Total of Schedule Items	**1,701,012**
	Add ___% Premium on Electrical Works of PWD-2022	
	Total of Schedule Items with Premium - A	
B	**NON-SCHEDULE ITEMS**	
1	VOICE, DATA COMMUNICATION & CCTV CABLING SYSTEMS (Passive Equipment Only)	
2	CCTV SYSTEM	
	Total of Non-Schedule Items - B	
	TOTAL AMOUNT (A+B)	

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
		SCHEDULE ITEMS				
1	8	**CCTV CAMERAS**				
	8-4	**IP CCTV CAMERAS**				
1.1	8-04-01	Supply, installation, testing and commissioning of Bullet IP Camera having following specifications:- Image device: At least 1/2.8 inch, Resolution & frames/sec: At least 2 MP/30fps, Video Compression: H.265,H.264, MJPEG Focal length (Verifocal): At least upto 12mm, Min illumination: 0 lux(B/W), 0.095 lux (Colour), Infrared viewable lenght: At least 30 m, Weather proof standard: IP66 at least, Vandal proof standard: At least IK10, complete in all respect as approved by the Engineer Incharge.	4	P/Job	48,477	193,908
1.2	8-04-03	Supply, installation, testing and commissioning of PTZ dome camera i/c controller having following specifications:- Zoom: At least 32X, Image device: At least 1/2.8 inch, Resolution & frames/sec: At least 2 MP/60fps, Video Compression: H.264, MJPEG, Focal length (Verifocal): At least upto 140mm, Min illumination: 0 lux(B/W), 0.1 lux (Colour), Infrared viewable lenght: At least 120 m, Weather proof standard: At least IP66, Vandal proof standard: At least IK10, complete in all respect as approved by the Engineer Incharge.	2	P/Job	592,002	1,184,004
	8-11	**FIBER OPTIC / MEDIA CONVERTER / ODF**				
1.3	8-11-02	Providing, Supplying, installation, fitting, fixing and commissioning of 8 Core single mode Fiber Optic Cable in given existing PVC Conduit, Box Conduit, complete in all respect as approved by the Engineer Incharge.	300	P/Mtr	1,077	323,100
		CARRIED TO ELV SUMMARY =====>>>>				**1,701,012**

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
		NON-SCHEDULE ITEMS				
1		**VOICE, DATA COMMUNICATION & CCTV CABLING SYSTEMS (Passive Equipment Only)**				
1.1		Supply, installation, testing and commissioning of following Data / Voice Cabinets, for patch panel, Fiber panels, adapter, PDU's, Fans and space for active switches as it may require to accommodate complete the entire passive and active network as per the single line diagram drawing and specification, complete in all respect.				
i		12U Data Rack in IT Room (800mmx800mm)	1	No.		
1.2		Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Voice with shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	6	No.		
1.3		Supply, installation, testing and commissioning of 4 Pair RJ-45, Cat-6 Simplex Outlet for Data with I/O - Shutter type with 16 SWG back box as per drawing and specification, complete in all respect.	6	No.		
1.4		Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Camera with shutter type and 16 SWG back box including tagging, as per drawing and specification, complete in all respect.	6	No.		
1.5		Supply, laying, testing and commissioning of CAT-6, 4 pair cable for Single RJ-45 outlet (Data, Voice and Camera system) in 25mm dia PVC conduit concealed / surface from each outlet to IDF racks, including tagging at both ends, complete in all respect.	450	Rm.		
1.6		Supply, laying, testing and commissioning of Cat 5e, 25 pair Backbone cable (outdoor type) from Admin building to IDF racks in already laid cable tray / conduit, including with all the necessary accessories as per drawing & specifications, complete in all respect.	150	Rm.		
1.7		Supply, installation, testing and commissioning of 24 port Cat 6, RJ 45 UTP Patch Panel fully loaded with tool less jacks and rear cable manager, as per drawing and specification, complete in all respect.	1	No.		
1.8		Supply, installing, testing and commissioning of 24 port Fiber Patch Panel fully loaded with pigtails etc., and rear cable manager, as per drawing and specification, complete in all respect.	1	No.		

BILL OF QUANTITIES

S.NO.	PWD Schedule 2022 Ref.No	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6	7 = 4 X 6
1.9		Supply, installation, testing and commissioning of 19" front/rear (as required) cable organizer between patch panels and active equipment to provide patch cable management including with all necessary accessories, as per drawing and specification, complete in all respect.	2	No.		
1.10		Supply, installation, testing and commissioning of CAT-6 UTP (RJ-45 to RJ-45) for the above Patch Panels including with all necessary accessories, as per drawing and specification, complete in all respect.				
i		CAT-6 (1m) Long Patch Cord	20	No.		
ii		CAT-6 (3m) Long Patch Cord	20	No.		
1.11		Supply, installation, testing and commissioning of Fiber Optic Patch Cord with SC/LC/APC connector, including with all necessary accessories, as per drawing and specification, complete in all respect.				
i		Fiber Optic (1m) Long Patch Cord	1	No.		
1.12		Supply, installation, testing and commissioning of following blocks in Data rack, as per drawing and specification, complete in all respect.				
i		50 Pair IDC Block	1	No.		
1.13		Installation, testing and commissioning by Manufacturer Authorized Agent / Dealer and handing over complete Voice & Data System to Owner with Providing Training voice data fuke & OTDR Testing,as build drawing,Rack layouts and certification's Principal, complete equipment's Manual and Warranty Documents to Owners representative.	1	Job		
		CARRIED TO ELV SUMMARY =====>>>>				
2		**CCTV SYSTEM**				
2.1		Installation, testing, commissioning, programming by Manufacturer Authorized Agent / Dealer and handing over complete CCTV System to Owner with providing training, SOP, complete equipment's manual and warranty documents to owners representative.	1	Job.		
		CARRIED TO ELV SUMMARY =====>>>>				

GATE OFFICE
PLUMBING WORKS

Summary

S. NO.	DESCRIPTION	TOTAL AMOUNT IN PAK RUPEES
A.	**SCHEDULE ITEMS**	
1	Plumbing Fixtures	156,526
2	Manholes	28,529
	Sub Total	**185,055**
	Add _____% Above/Below/At par on Plumbing Works of Composite Schedule of Rates 2022, PWD Schedule 2022	
	TOTAL-A Rs.	
B.	**NON-SCHEDULE ITEMS**	
1	Water Supply	
2	Sanitary Sewage	
3	Fire Fighting Works	
	SUB-TOTAL-B Rs.	
	TOTAL AMOUNT (A+B) FOR 1 No.	

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
A	**SCHEDULE ITEMS**					
1		**PLUMBING FIXTURES:**				
1.1	**301-1**	Providing and fixing best quality squatting type glazed earthward W.C.Pan, Pakistan (of not less than 18" clear opening as measured between the flushing rimes) Complete with and including the cost of 13.6 liters best quality low level plastic flushing cistern with internal fittings complete, P.V.C. flushing pipe suitable for this type with fittings and making requisite number of holes in walls, plinth & floor for pipe connections and making good in cement concrete 1:2:4.	2	Nos.	12,602	25,204
1.2	**301-8 & 10 & 14**	Providing and fixing 25 inches x 18 inches (635 mm x 457 mm) lavatory basin in white glazed earthenware (Pakistani) complete with and including the cost of Brass oxidized bolts kit built into wall /2 inch (15 mm) dia. Chrome plated mixer 1-1/4" inches (32mm) rubber plug and chrome plated brass chain, 1-1/4 inches (32 mm) dia brass waste of approved pattern, 1-1/4 inches (32 mm) dia. Malleable iron or C.P. brass traps malleable iron or brass unions and making requisite number of holes in walls plinth and floor for pipe connections and making god in cement concrete 1:2:4 Extra over item No. 8 and 9 (Wash basin) for providing and fixing best available (Pakistani make) white glazed earthenware pedestal.. Extra over item No.8 and 9 for providing single hole chromium plated mixer tap 1/2 inch (15 mm) dia (English or approved foreign make).	2	Nos.	21,878	43,756
1.3	**301-13**	Providing and fixing Shower tray made of fiber glass of any color and design 31 inches x 31 inches (787 mm x 787 mm).	0	Nos.	6,588	-
1.4	**301-20**	Providing and fixing standing wall shower of CP brass 3 knobs of approved quality mixer unit and moveable shower head complete..	0	Nos.	6,128	-
1.5	**301-21**	Providing and fixing approved quality stainless steel sink 60" x 20" Pak made (Atlas) complete with brass oxidized bolt kit/angle iron brackets built into walls ½" dia CP sink mixer 1-1/4" rubber plug and CP brass chain 1-1/4" CP brass waste 1-1/4" dia malleable iron or CP brass bottle trap with malleable iron or brass unions and making requisite number of holes in walls, plinth and floor for pipe connections and making good in cement concrete 1:2:4	2	Nos.	34,495	68,990

Continued..

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
		PLUMBING FIXTURES (Cont....)				
1.6	**302-6**	Providing and fixing 20 inches x 16 inches (508 mm x 406 mm) Looking mirror of Belgium glass complete with Plastic frame and C.P. Brass screws.	0	Nos.	3,046	-
1.7	**302-9**	Providing and fixing bath room accessories of set of 6 pieces consist of one shelf, one towel rod with bracket, one soap dish, one tooth brush holder with glass and cover, one tissue paper holder one double hook one towel ring etc. complete of approved quality as per direction of Engineer in-charge.	1	Nos.	11,813	11,813
1.8	**302-13**	Providing and fixing chrome plated Muslim bib-cock without Muslim shower of approved quality	2	Nos.	3,382	6,764
		CARRIED TO SUMMARY				**156,526**

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
2		**MANHOLES**				
2.1	**315-3**	Providing manhole Type 'B" size 3'-0" x 2'-6" or 914mm x 762mm x 4ft (1.22mm) deep as per approved design and specifications complete for 4" to 12" diameter pipe, 4 ft. to 7'-5" Depth with cast iron cover and frame weights 1 Cwt. 3 Qtrs or 88.9 kg,in 6" thick RCC 1:2:4 slab 8" thick,c.c. 1:3:6 block masonry walls set in 1:3 c.m. 6" inch thick, 1:3:6, c.c. in foundation 1:2:4 c.c. in benching, 1/2" thick cement plaster in 1:4 c.m. to all inside wall surfaces, channels and benching etc. and top including providing and fixing cast iron foot rest at every foot of depth and making requisite number of main and branch channels complete but excluding that cost of excavation, backfilling , disposal of excavated sruff, manhole cover and frame.	1	Nos.	28,529	28,529
		CARRIED TO SUMMARY				**28,529**

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
B	**NON-SCHEDULE ITEMS**					
1		**WATER SUPPLY:**				
1.1		**Cold and Hot Water Supply Piping**				
	Non-Sch	Supply, installation Testing and Commissioning of PPR PN - 20 Cold/Hot water pipes as per DIN 8077-8078 with molded fittings PN - 25 as per DIN 16962, including pipe supports a as indicated on the drawing, as per specifications and Engineers approval.				
i		¾" dia	90	Rft		
ii		1" dia	300	Rft		
iii		1¼" dia	50	Rft		
iv		1½ dia	0	Rft		
v		2" dia	0	Rft		
1.2		**Valves**				
	Non-Sch	Providing and fixing of PPR Coated, brass Gate valves (of same material as piping) as indicated on the drawing, as per specifications and Engineers approval.				
i		1" dia	4	Nos.		
ii		1¼" dia	2	Nos.		
iii		1½ dia	0	Nos.		
iv		2" dia	0	Nos.		
1.3		**Water Tanks and Connection**				
1.3.1	Non-Sch	Connection for water tank including with valves, supports, excavation and Backfill, complete all in accordance with the drawing and specifications.	1	Item		
1.3.2	Non-Sch	Connection to overhead water tanks using Float switch	0	Nos.		
1.3.3	Non-Sch	Cast Iron Medium Duty Cover For RCC water tanks	0	Nos.		

Continued..

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
		WATER SUPPLY (Cont....)				
1.4		**Transfer Pumps**				
	Non-Sch	Supply and installation of below mentioned Transfer Pump Set including pump foundation, control panel, automatic float switch, wiring, valves, piping, accessories, etc., as indicated on the drawing, as per specifications and Engineers approval.				
i		Transfer Pump (1 duty) Flow = 30GPM @ 35ft. head	1	No.		
1.5		**GRP Water Overhead Tank**				
	Non-Sch	Supply and installation of 525 liter Loft GRP Water tanks including Drain valve, Air Relief Valve, vent pipes, Access/Manhole Covers, accessories, valves, supports, ladders, low and high level float switches, etc., complete all in accordance with the specifications.	1	No.		
1.6		**PE Water Underground Tank**				
	Non-Sch	Providing and fixing of 1000 gallon Horizontal type Polyethylene Water tanks to be installed underground, including the cost of Excvation, clean sand as backfill, Drain valve, Air Relief Valve, vent pipes, Access/Manhole Covers, accessories, valves, supports, ladders, low and high level float switches, etc. as per drawings, specification and engineer recommendation.	1	No.		
		CARRIED TO SUMMARY	**Total**			

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
2		**SANITARY SEWAGE:**				
2.1		**Soil, Waste, Vent and Rainwater Pipes**				
2.1.1	Non-Sch	Providing and fixing, uPVC pipes and fittings as per BS EN 1329 for above ground installations for Soil, Waste, Vent & Rw pipes including cleanout plug, clamps, hanger collars, supports, specials (bend, tees, Y-tee etc.) as indicated on the drawing, as per specifications and Engineers approval.				
i		2" dia	50	Rft.		
ii		3" dia	40	Rft.		
iii		4" dia	90	Rft.		
2.1.2	Non-Sch	Providing and fixing, uPVC pipes and fittings as per BS EN 1401 for below ground installations for Soil pipes including excavation, backfill, fittings (bend, tees, Y-tee etc.) as indicated on the drawing, as per specifications and Engineers approval.				
		(iv) 6" dia	90	Rft.		
2.2		**Drainage Specialties**				
2.2.1	Non-Sch	Providing and fixing, PVC floor trap with multiple dia inlet and cleanout plug of the approved self cleaning design with S.Steel grating, as indicated on the drawing, as per specifications and Engineers approval.	6	Nos		
2.2.2	Non-Sch	Providing and fixing UPVC cowl for vent pipe of the following dia including all accessories complete in all respects.				
i		3" dia	2	Nos		
ii		4" dia	2	Nos		
iii		6" dia	0	Nos		
2.3	Non-Sch	Providing and fixing, PVC Roof Drains as per specifications and Engineers approval.	3	Nos		
		Continued..				

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
		SANITARY SEWAGE (Cont....)				
2.4		**Gully Traps**				
	Non-Sch	Construction of 18" x 18" Cement Concrete gully trap with 12"x 12" manhole cover as specified and shown on the drawing, as per specifications and Engineers approval.	2	Nos.		
2.5		**External Connection**				
	Non-Sch	Connection to external Sewage network, after obtaining approval from local authorities including the cost of excavation, Piping as specified and shown on the drawing, as per specifications and Engineers approval.	1	Job.		
		CARRIED TO SUMMARY	**Total**			

Item No.	PWD Schedule 2022 Ref.No	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
3		**FIRE FIGHTING**				
3.1		Supply and installation of below mentioned Portable Fire Extinguishers with Wall mount brackets as indicated on the drawings, as per specifications and Engineers Recommendation				
i	Non-Sch	6 Kg C02 wall mounted fire extinguisher	2	Nos.		
ii	Non-Sch	5 Kg Dry powder wall mounted fire extinguisher	2	Nos.		
		Sub Total for Non Schedule Items	**Total**			

GATE OFFICE
HVAC WORKS

S. NO.	DESCRIPTION	TOTAL AMOUNT IN PAK RUPEES
1	DX- SPLIT TYPE AIRCONDITIONING UNITS	
2	HVAC FANS	
3	CONDENSATE DRAIN PIPING	
4	HANGER & SUPPORTS	
5	CIVIL WORKS	
6	GENERAL MECHANICAL ITEMS	
	GRAND TOTAL SUMMARY	

S.No.	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6=(3X5)
1	**DX- SPLIT TYPE AIRCONDITIONING UNITS** Supply, Installation, Testing & Commissioning of DX Split Air-conditioning Units, complete refrigerant piping, insulation, cladding, refrigerant tray, cable tray & acessories. Indoor unit with all sections and components given in the schedule and specifications of DX Split Air-conditioning Units, including uplifting / lowering, loading / unloading at site, complete in all respect and as directed by the Engineer incharge in following sizes and capacities. **GROUND FLOOR**		475,020		
i	DX-01 TO 03 / CU-01 TO 03 (1.5 TR Capacity Wall Mounted Type)	3	Nos.		
	AMOUNT CARRIED TO HVAC SUMMARY				

S.No.	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6=(3X5)
2	**HVAC FANS** Supply, installation, testing and commissioning of HVAC fans, as per equipment schedule, as shown on the drawings including all labour, material and accessories, complete in all respect and to the satisfaction of engineer incharge.				
	GROUND FLOOR				
i	EF-01 & 02 (300 cfm)	2	Nos.		
	AMOUNT CARRIED TO HVAC SUMMARY				

S.No.	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6=(3X5)
3	**CONDENSATE PIPING** Providing and fixing, uPVC Class 'E' pipes and fittings as per BS 3505 (EN 1401) for Condenser Water drainage including fittings, bends, cuttings, filling etc. as indicated on drawings, as per specifications and Engineers approval.				
i	1" dia	80	Rft		
	AMOUNT CARRIED TO HVAC SUMMARY				

S.No.	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6=(3X5)
4	**HANGER & SUPPORTS** Supply, installation, testing and commissioning of Galvanized Hanger and Supports for piping, ducting, all HVAC Equipments, as shown on the drawings and as specified in technical specification, complete with angle iron, rawal bolts, threading rods, nuts and bolts, wooden pieces, including the cost of cleaning, painting with corrosion resistant paint, jointing and welding, including all labour, material and accessories, complete in all respect and to the satisfaction of Engineer Incharge.	1	Lot		
	AMOUNT CARRIED TO HVAC SUMMARY				

S.No.	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6=(3X5)
5	**CIVIL WORKS** Making and cutting in walls, slabs and preparation of RCC foundation for Condensing Unit, Fans and all other HVAC equipments in all other work such as Openings, Penetrations, Firestopping, Acoustic Cork sheet, Wooden Frame Sleeves and Pipe Sleeves, plaster finish etc as directed by Engineer Incharge, complete in all respect.	1	Job		
	AMOUNT CARRIED TO HVAC SUMMARY				

S.No.	DESCRIPTION	QTY	UNIT	RATE (Rs.)	AMOUNT (Rs.)
1	2	3	4	5	6=(3X5)
6	**GENERAL MECHANICAL ITEMS**				
i	**PAINTING & FINISHES** Providing Painting and Finishing,as directed by the Engineer Incharge, complete in all respect.	1	Job		
	AMOUNT CARRIED TO HVAC SUMMARY				

BOUNDARY WALL (REMAINING WORKS)

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Boundary Wall Remaning Works	
					Rate (RS)	Amount (RS)
		SCHEDULE ITEMS-A				
1		**Dismantling Block Masonry**				
	Code-123	Dismantling cement concrete block masonry work in lime or cement mortar in foundation, basement, plinth and ground floor including stacking salvaged material (serviceable) and disposing of surplus material as directed with in three chains (91.5 m). etc complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item #12	Ground Floor	500.00 Cft	100 Cft	3,006.25	15,031
2		**Dismantling R.C.C**				
	Code-123	Dismantling R.C.C. including separating reinforcement from concrete in foundation, basement, plinth and ground floor including stacking at site and disposing of unserviceable material within three chains (91.5 m) etc complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item #15	Ground Floor	818.95 Cft	100 Cft	8,456.25	69,252
3	Code-102	Clearing jungle (ordinary) by cutting, removing all shrubs, trees, upto 6 inches (152 mm) girth, etc. and taking out their entire roots and filling the hollows with earth complete with dressing, consolidating and watering the filling including stacking the serviceable materials and disposal of useless material as directed, lead to 10 chains (305 Rm), cost of earth included. complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the				
	Item #1	Ground Floor	2500 Sft	Sft	25.23	63,078
4	Code -103	Excavation for foundations trenches, drains in soft or disintegrated rock by hammering, chisling & jumper work including stacking of serveable material & unserviceable material separately, lead up to one chain (30.5 R.m) and lift up to 5 feet (1.52 m) complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item # 7	From ± 0'-0" to -5' - 0"	160 Cft	100 Cft	2,328.63	3,726
5	Code -104 Item # 8	**EARTH WORKS** Supplying earth from approved outside Sources within a radius of 5 miles (8km) including digging , loading and unloading and filling in foundations trenches Plinth or under Floor , etc. including breaking clods, watering, consolidation by ramming in layers not exceeding 9 inches (229 mm) in depth to full compaction,dressing and disposal of surplus excavated stuff as directed, lead up to one chain (30.5 R.m) and lift up to 5 feet (1.52 m) etc .complete in all respects as per drawing, standard , specifications and as directed by the Engineer	150 Cft	100 Cft	3,254.05	4,881

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Boundary Wall Remaning Works	
					Rate (RS)	Amount (RS)
6	Code -106	**SUB STRUCTURE** ***Note: All RCC Concrete will be used only Ready mixed.*** **CONCRETE WORKS** Providing and laying in situ 1:4:8 (1 cement 4 sand and 8 coarse aggregate) cement concrete using crushed graded boulders 3/4" inch (19 mm) and down gauge in foundation, basement and plinth including form work, compacting, curing and removal of form work etc. complete, foundation and basement up to 5 feet (1.52 m) depth and plinth up to 4 feet (1.2 m) height from ground level etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 11	Below plinth beam,situ,walls,tanks, over stone soling or where required **(Cylindrical 1000 Psi)**	200 Cft	100 Cft	32,221.55	64,443
7	Code -114	**REINFORCED CONCRETE WORKS** Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of 3000 lbs. per sq. inch (20.69 N/mm2 at 28 days) with a mix not leaner than 1:2:4 in columns footing of required shape with columns and pillars, of any shape including form work and its removal, compacting, leveling and curing etc. complete but excluding the cost of reinforcement, in foundation basement and plinth etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 1+136	Foundation for any type **(Cylindrical Strength 2500 Psi)**	150 Cft	100 Cft	38,098.77	57,148
8	Code -114	Providing and laying reinforced cement concrete using screened graded bajri 3/4 inch (19 mm) and down gauge having a minimum works cube crushing strength of 2250 lbs. per sq inch (15.52 N/mm2) at 28 days with a mix not leaner than 1:2:4 in columns of square or rectangular shape of regular section including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, in foundation basement and plinth .. etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 4	Columns upto plinth	300 Cft	100 Cft	41,408.12	124,224
9	Code -114	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of 3000 lbs. per sq. inch (20.69 N/MM 2 at 28 days) with a mix not leaner than 1:2:4 in plinth beams of required shape and columns and design including form work and its removal, compacting, leveling and curing etc. complete but excluding the cost of reinforcement, in foundation basement and plinth etc. complete in all respects as per drawing standard, specifications and as directed by the Engineer.				
	Item # 8+136	Plinth Beams i/c nibs/projections / **(Cylindrical Strength 2500 Psi)**	330 Cft	100 Cft	40,365.27	133,205

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Boundary Wall Remaning Works	
					Rate (RS)	Amount (RS)
10	Code -114 Item # 166	Providing and laying hard grade ribbed deformed (minimum yield point 60,000 psi or 414 Mpa) reinforcement bars with & including the cost of straightening, cutting, bending, binding, wastage, and such overlaps as are not shown in the drawings, placing in position on cement concrete 1:2:4 precast or Ms. chairs, tying with binding wire, cost of chairs and wires etc. in all kinds of RCC work in foundation, basement, plinth and ground floor of building including septic tanks and under ground tanks and in projections for future extension.etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer. **(Bars to be cut and placed in position at any level according to the Bar bending schedule prepared by the contractor and approved by the Engineer).**	3,500	Kg	282.45	988,575
11	Code -114	Providing and laying reinforced cement concrete using screened graded bajri 3/4 inch (19 mm) and down gauge having a minimum works cube crushing strength of 2250 lbs. per sq inch (15.52 N/mm2) at 28 days with a mix not leaner than 1:2:4 in columns of square or rectangular shape of regular section including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, in the ground floor etc. complete in all respects as per drawing, standard , specifications and as directed by the Engineer.				
	Item # 24	Ground Floor Columns	650 Cft	100 Cft	52,186.17	339,210
12	Code-114	Providing and laying reinforced cement concrete with using crushed graded boulders 3/4" inch (19 mm) and down gauge having a minimum works cube crushing strength of 3000 lbs. per sq. inch (20.69 N/MM 2 at 28 days) with a mix not leaner than 1:2:4 in straight beams lintels cantilever beams of required shape or section including form work and its removal, compacting and curing etc. but excluding the cost of reinforcement, in basement and ground floor etc. complete in all respects as per drawing standard, specifications and as directed by the Engineer.				
	Item # 8	Beams/Arches/Purdi/bracing/Lintels/nibs/sills/coping/parape t wall/bands/around opening and projections	400 Cft	100 Cft	46,810.39	187,242
13		**Block Masonry (Solids)**				
	Code-110	Providing and laying 1:3:6 machine made cement concrete **solid block masonry 4 to 6 inches** (102 mm to 152 mm) thick using graded screened bajri 3/4 inch (19 mm) and down gauge set in cement mortar 1:6 including scaffolding, raking out joints and curing etc. complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item #44+92+100	Ground Floor	2221 Cft	100 Cft	35,217.52	782,181
14		**WALL FINISHES**				
		Internal Wall Plaster				

S.No	PWD Schedule 2022 Ref.No	Description	Qty	Unit (Sch. Rate)	Boundary Wall Remaning Works	
					Rate (RS)	Amount (RS)
	Code-122	1/2" (13 mm) thick cement plaster 1:6 on wall columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, grooves as specified and curing etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
		Ground Floor	59000 Sft	100 Sft	4,034.92	2,380,603
15	Code -122	**WALL FINISHES** **Internal Wall Plaster** 3/4" (19mm) thick cement plaster 1:6 on wall columns etc .in basement , plinth ,mezzanine and ground floor including making edegs , corners , grooves as specified & curing etc , complete in all respects as per specification & relavant drawings and all works to the satisfication of the engineer.				
	Item # 10	Ground Floor	45000 Sft	100 Sft	4,815.28	2,166,876
16	Code-122	Painting three coats with **weather shield paint deluxe (ICI)** make of approved shade on plaster surface (External) and including the cost of cleaning the surface, sand papering etc. complete at any height in any floor etc., complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.				
	Item # 172	Ground Floor to Roof	92000 Sft	100 Sft	4,408.75	4,056,050
		Total Amount A				**11,435,725**
		NON SCHEDULE ITEMS-B				
17	N.S.I	Razor Wire with G.I Barbed Wire Providing & fixing Razor wire 600mm dia having 2.6mm wire with blade of .5mm thickness, with 6 rows of G.I barbed wire 2 ply 12 gauge line wire with 4 points barb of 14 gauge G.I wire @ 100mm apart, on Y shape M.S angle 50mm x 50mm x6mm welded with plate 100mm x 200mm x 5mm thick with four holes for fixing on wall by anchor bolts in RCC/masonry pillars, including making scraping & finishing the surface, including 2 coats of enamel painting over a coat of red oxide etc., complete in all respect as per specifications & relevant approved drawing and direction of the Engineer.				
		Ground Floor to Roof	5,000	RFT		
		Total Amount B				
		Total Amount (A+B)				
		Schedule Items ___% Above (A)				
		Total Amount				

S M I U

DEVELOPMENT OF SINDH MADRESSATUL ISLAM UNIVERSITY (SMIU) CAMPUS AT EDUCATION CITY MALIR KARACHI, PAKISTAN

(Lot No.5B, Gate Office)

STRUCTURE
Volume - IV Tender Drawings

AUGUST, 2024

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7,
Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Gate Office

LIST OF DRAWINGS

S.NO.	DRAWINGS NO.	DESCRIPTION
STANDARD DRAWINGS		
01	EA-00986-SMGO-S-0000	LIST OF DRAWINGS
02	EA-00986-SMGO-S-0001	GENERAL NOTES
03	EA-00986-SMGO-S-0011	STANDARD DETAILS (SHEET 1 OF 5)
04	EA-00986-SMGO-S-0012	STANDARD DETAILS (SHEET 2 OF 5)
05	EA-00986-SMGO-S-0013	STANDARD DETAILS (SHEET 3 OF 5)
06	EA-00986-SMGO-S-0014	STANDARD DETAILS (SHEET 4 OF 5)
07	EA-00986-SMGO-S-0015	STANDARD DETAILS (SHEET 5 OF 5)
FOUNDATION PLAN		
08	EA-00986-SMGO-S-1001	COLUMN & FOUNDATION LAYOUT PLAN AND DETAILS
09	EA-00986-SMGO-S-1002	COLUMN SCHEDULE AND DETAILS
FRAMING PLAN		
10	EA-00986-SMGO-S-2001	PLINTH FRAMING PLAN AND SECTION DETAILS
11	EA-00986-SMGO-S-2002	ROOF FRAMING PLAN AND SECTION DETAILS
12	EA-00986-SMGO-S-2003	TOP ROOF FRAMING PLAN
13	EA-00986-SMGO-S-2004	TOP ROOF BEAM ELEVATION DIMENSIONAL DETAILS (1 OF 2)
14	EA-00986-SMGO-S-2005	TOP ROOF BEAM ELEVATION DIMENSIONAL AND SECTION DETAILS (2 OF 2)
REINFORCEMENT PLAN		
15	EA-00986-SMGO-S-3001	ROOF SLAB / BEAM REINFORCEMENT AND SECTION DETAILS
BEAM ELEVATION DETAIL		
16	EA-00986-SMGO-S-4000	BEAM STANDARD DETAILS
17	EA-00986-SMGO-S-4001	TOP ROOF BEAM ELEVATION REINF. AND DETAILS (1 OF 2)
18	EA-00986-SMGO-S-4002	TOP ROOF BEAM ELEVATION REINF. AND SECTION DETAILS (2 OF 2)

Client :

Sindh Madressatul Islam University

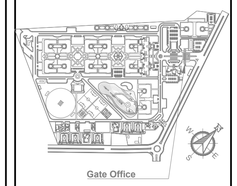
Consultant :

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status: CONSTRUCTION

Building Name: GATE HOUSE

Drawing Title : LIST OF DRAWING

Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code : 00986		Rev. : 0
Drawing No. : EA-00986-SMGO-S-0000		

Last Save: Saeed.ahmed Date: Tuesday, August 27, 2024

PROJECT DESCRIPTION

1 – THE PROPOSED PROJECT SMIU IS LOCATED IN MALIR KARACHI.
IT MAINLY COMPRISES OF CLASS ROOM , ART ROOM , LIBRARY, MOSQUE
FACULTY BLOCK , HOSTEL , FACULTY & STAFF RESIDENCE AND COMMON FACILITIES.
FACULTY OF MEDIA STUDIES & SOCIAL SCIENCES,
FACULTY OF NATURAL STUDIES & SOCIAL SCIENCES
FACULTY OF NATURAL & BASIC SCIENCES

FLOOR PROVISIONS OF SINDH MASRESSATUL ISLAM UNIVERSITY, MALIR CAMPUS, KARACHI		
NAMES OF BUILDINGS	EXISTING FLOORS	FUTURE FLOOR PROVISION
FACULTY OF MEDIA STUDIES AND SOCIAL SCIENCE	G+2	+1
FACULTY OF NATURAL AND BASIC SCIENCE	G+2	+1
ADMIN BLOCK	G+2	+1
STUDENTS WALFARE CENTRE	G	NIL
LIBRARY	G+2	NIL
CAFETERIA	G	NIL
MALE STUDENT HOSTEL	G+2	+2
FEMALE STUDENT HOSTEL	G+2	+2
VC RESIDENCE	G	NIL
FACULTY APARTMENT A	G+2	+2
FACULTY APARTMENT B	G+3	+1
FACULTY APARTMENT C	G+2	+2
HOUSES FOR STAFF	G+2	+2
MALE FACULTY HOSTEL	G	+1
FEMALE FACULTY HOSTEL	G	+1
GATE OFFICE	G+1	NIL
MASJID	G	NIL
SUBSTATIONS	G	NIL

GENERAL

G1 STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DISCIPLINE DRAWINGS, DOCUMENTS, SPECIFICATIONS ETC. AS PART OF THE CONTRACT DOCUMENT OR. MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.

G2 DIMENSIONS SHALL NOT BE OBTAINED BY SCALING DRAWINGS.

G3 FOR MAIN SETTING OUT LINES AND LEVELS REFER TO ARCHITECTURAL DRAWINGS.

G4 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THE SAFETY OF CONSTRUCTION AT ALL TIMES AND SHALL ENSURE THAT NO PART OF INTERMEDIATE COMPLETED CONSTRUCTION IS HAZARDOUS (FOR EXAMPLE; SIDES OF EXCAVATION, STARTER BARS ETC.)

G5 THE CONTRACTOR SHALL PROVIDE TEMPORARY BRACING AND SHORING AGAINST LATERAL FORCES AND ALL CONSTRUCTION LOADS THROUGHOUT THE CONSTRUCTION PROCESS.

G6 ALL ELEMENTS OF THE STRUCTURE DESIGNED BY THE CONTRACTOR SHALL BE SUBMITTED TO DESIGN CONSULTANT FOR REVIEW.

G7 THE DESIGN CONSULTANT'S REVIEW PROCESS FOR ALL SUBMITTALS, DRAWINGS, METHOD STATEMENTS AND DOCUMENTS IS ONLY COMPLETE ONCE A STATUS OF 'NO OBJECTON' IS REACHED. THE SUBMITTAL SHALL BE REVIEWED BY THE DESIGN CONSULTANT FOR COMPLIANCE WITH THE DESIGN INTENT THIS DOES NOT RELIEVE THE CONTRACTOR FROM HIS CONTRACTUAL RESPONSIBILITIES.

G8 FOR ALL BUILDERS WORK INFORMATION (OPENINGS IN STRUCTURAL ELEMENTS):– LIGHTING POINTS, GULLIES, CAST–IN PIPES, SLEEVES, ELECTRICAL TRENCHES, MANHOLES ETC, REFER TO MEP DRAWINGS FOR LOCATION. THE CONTRACTOR SHALL PREPARE COORDINATED SERVICES DRAWINGS IDENTIFYING STRUCTURAL, MEP AND ARCHITECTURAL ELEMENTS/DETAILS FOR CONSULTANT'S REVIEW BEFORE COMMENCEMENT OF CONSTRUCTION IN THE AREA CONCERNED.

G9 ALL DESIGN, WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH THE CURRENT ACI, UBC, AISC, PCB AND LOCAL AUTHORITY STANDARDS AND PROJECT DESIGN CRITERIA UNLESS NOTED OTHERWISE.

FOUNDATIONS

F1 THE CONTRACTOR SHALL READ AND FAMILIARIZE HIMSELF WITH THE GEOTECHNICAL INVESTIGATION REPORT AS WELL AS VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH THE SURFACE AND SUBSURFACE CONDITIONS.

F2 LOOSE POCKETS OF SOIL WHICH ARE ENCOUNTERED SHALL BE REMOVED AND REPLACED WITH GOOD SOIL COMPACTED TO ACHIEVE THE DESIRED BEARING PRESSURE.

F3 ANY ADJACENT FOOTING IN THE VICINITY OF THE WORK SHALL BE PROPERLY PROTECTED BEFORE EXECUTION OF WORK.

F4 FOUNDATION STRICTLY BE PLACED ON FIRM WELL COMPACTED EARTH ACCORDING TO GEOTECHNICAL REPORT ALL THE GROUND IMPROVEMENT WORK SHALL BE DONE ACCORDING TO GUIDE LINE PROVIDED IN GEOTECHNICAL REPORT.

F5 IT IS IMPORTANT TO NOTE THAT BEFORE PLACING FOUNDATION CONCRETE THE EXCAVATIONS SHOULD BE CAREFULLY INSPECTED TO ENSURE THAT FILL HAS BEEN CROSSED AND FOUNDATIONS ARE BEING PLACED IN COMPETENT SOIL. THIS PRECAUTION IS NECESSARY TO GUARD AGAINST LOCALIZED FILLS AND INHOMOGENITIES.

DESIGN LOADS

DL1 SEISMIC LOADING IN ACCORDANCE WITH
PAKISTAN BUILDING CODE–SEISMIC PROVISION 2007 (BCP–SP–2027)

SEISMIC ZONE	2B
SEISMIC ZONE FACTOR	= 0.2
SOIL PROFILE	= TYPE SC (AS PER GEO. TECH. REPORT)
IMPORTANCE FACTOR, I	= 1.0
OCCUPANCY CATEGORY IV	STANDARD OCCUPANCY
NUMERICAL COEFFICIENT, R	= AS PER TABLE 16–N–UBC97.
Ca	= 0.24
Cv	= 0.32

LIVE LOADS

DL2

OFFICES	= 50	psf
CLASSROOM	= 40	psf
LIBRARIES READING ROOM	= 60	psf
LIBRARIES STACKING ROOM	= 150	psf
LECTURE HALL	= 100	psf
DINING ROOMS AND RESTAURANTS	= 100	psf
CORRIDORS (FIRST FLOOR AND BELOW)	= 100	psf
OFFICE CORRIDORS (ABOVE FIRST FLOORS)	= 80	psf
STAIRS AND LOBBIES	= 100	psf
BALCONIES (EXTERIOR)	= 60	psf
FIRE ESCAPES	= 100	psf
YARDS AND TERRACES, PEDISTRIAN	= 100	psf
CAR PARKING	= 70	psf
FOOD COURT (RESTAURANT)	= 100	psf
LV//GENERATOR ROOM	= 200	psf
CHILLERS/AHU	= 200	psf

DEAD LOADS

DL3

CEILING, MEP SERVICES	= 10	psf
FLOOR FINISHES	= 36	psf
DRY PARTITION WALL	= 10	psf

DESIGN CODE OF PRACTICE

DC1 1997 UNIFORM BUILDING CODE. FOR SEISMIC DESIGN & WIND LOAD.

DC2 ACI–318–14 BUILDING CODE FOR STRUCTURAL CONCRETE AND COMMENTARY.

DC3 ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

DC4 AISC 14 EDITION SPECIFICATION FOR STRUCTURAL STEEL BUILDING.

DC5 BCP–2007 SEISMIC BUILDING CODE OF PAKISTAN.

DC7 ACI 360R–92 DESIGN OF SLAB ON GRADE

ANCHORAGE OF BARS BY HOOKS:

* THE DIMENSIONS AND BENDING RADII FOR HOOKS TO BE USE AS STANDARDIZED IN THE ACI CODE:

1– A 180° BEND PLUS AN EXTENSION OF AT LEAST 4 BAR DIAMETERS, BUT NOT LESS THAN 2.5 IN AT THE FREE END OF BAR OR

2– A 90° BEND PLUS AN EXTENSION OF AT LEAST 12 BAR DIAMETERS AT THE FREE END OF THE BAR, OR

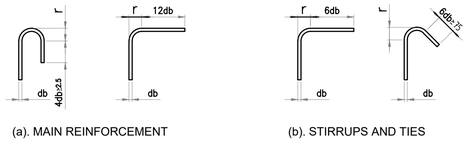
3– FOR STIRRUP ANE TIE ANCHORAGE ONLY:

a. FOR NO. 5 BARS AND SMALLER, A 90° BEND PLUS AN EXTENSION OF AT LEAST 6 BAR DIAMETERS AT THE FREE END OF THE BAR, OR

b. FOR NOS. 6.7 AND 8 BARS, A 90° BEND PLUS AN EXTENSION OF AT LEAST 12 BAR DIAMETERS AT THE FREE END OF THE BAR, OR

c. FOR NO. 8 BARS AND SMALLER, A 135° BEND PLUS AN EXTENSION OF AT LEAST 6 BAR DIAMETERS AT THE FREE END OF THE BAR.

THE MINIMUM DIAMETER OF BEND, MEASURED ON THE INSIDE OF THE BAR, FOR STANDARD HOOKS OTHER THAN FOR STIRRUPS OR TIES IN SIZES NOS. 3 THROUGH 5, SHOULD NOT BE LESS THAN 6 BAR DIAMETER. FOR STIRRUP AND TIE HOOKS, FOR BAR SIZES NO.5 AND SMALLER, THE INSIDE DIAMETER OF BEND SHOULD NOT BE LESS THEN 4 BAR DIAMETERS, ACCORDING TO ACI CODE:



(a). MAIN REINFORCEMENT (b). STIRRUPS AND TIES

r = 4db FOR db ≤ NO. 8
r = 5db FOR db > NO. 8

6 - GENERAL CONSTRUCTION CONDITION

GC1 ALL EXCAVATION SHALL BE BASED ON ENGINEERING SHOP DRAWINGS PREPARED BY THE CONTRACTOR, INCLUDING PLANS AND SECTIONS OF EXCAVATION SEQUENCES.

GC2 THE CONTRACTOR SHALL PROVIDE SURFACE DRAINAGE CHANNELS AND SUMPS AND SUMP PUMPS TO PROTECT ALL EXCAVATIONS FROM FLOODING. FLOODING OF ANY EXCAVATION AFTER APPROVAL OF SUB GRADE WILL BE A CAUSE FOR REVOCATION OF APPROVAL AND COMPLETE RE–PREPARATION OF THE SUBGRADE.

GC3 THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MAT/SHEET COVERING) FOR ALL EXCAVATED SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO ENVIRONMENTAL CONDITIONS.

GC4 THE EXCAVATION RETENTION SYSTEM SHALL BE DONE BY THE CONTRACTOR, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH THE GEOTECHNICAL DESIGN PARAMETERS AND SOIL PRESSURES AS INDICATED IN THE GEOTECHNICAL INVESTIGATION REPORT.

GC5 THE CONTRACTOR SHALL CONTINUOUSLY SURVEY VERTICAL AND HORIZONTAL MOVEMENTS OF THE TOP OF THE SOIL BENCH MARKS ADJACENT TO AND AWAY FROM THE SITE PERIMETER FOR VERTICAL AND HORIZONTAL MOVEMENTS AND OBSERVATION WELLS FOR MONITORING WATER LEVELS BELOW GROUND SURFACE.

GC6 THE SITE SHALL BE DE–WATERED, AS NECESSARY, BEFORE (OR AS) THE EXCAVATION PROCEEDS. THE CONTRACTOR SHALL PROVIDE ALL CONSTRUCTION EQUIPMENT FOR THE DE–WATERING SYSTEM INCLUDING, BUT NOT LIMITED TO, TRENCHES, SUMPS, DE–WATERING WELLS, WELL POINTS, OBSERVATION WELLS, PUMPING SYSTEM, DISPOSAL LOCATION, SETTLING BASINS, MAINTENANCE AND EMERGENCY BACK–UP EQUIPMENT, ETC.

GC7 THE DE–WATERING SYSTEM SHALL MAINTAIN THE WATER LEVEL A MINIMUM OF 3ft BELOW THE DEEPEST FOUNDATION SUBGRADE AT ALL TIMES.

REINFORCED CONCRETE

C1 THE CONTRACTOR SHALL SUBMIT DETAILED RC DRAWINGS AND BAR BENDING SCHEDULES SHOWING BAR SIZES, SPACING, PLACEMENT AND SUPPORT DETAILS DOWELS AT EXPANSION JOINTS AND LAPS ETC. FOR REVIEW AND ACCEPTANCE OF THE DESIGN CONSULTANT. WORK SHALL NOT COMMENCE UNTIL THE SHOP DRAWINGS ARE REVIEWED AND ACCEPTED REVIEW OF SHOP DRAWINGS DOES NOT ALLEVIATE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE INPUT OF ALL TRADES ON THE SHOP DRAWINGS.

C2 REFER TO SPECIFICATIONS FOR QUALITY AND PERFORMANCE REQUIREMENTS OF CONCRETE.

(i) NORMAL CONCRETE NOT IN CONTACT WITH THE GROUND:

CEMENT	ORDINARY PORTLAND CEMENT (OPC)
MIN. CEMENT CONTENT	24 lb/ft³(380kg/m³)
MAX. W/C RATIO	0.40

(ii) NORMAL CONCRETE IN CONTACT WITH THE GROUND:

CEMENT	AS PER SOIL REPORT
MIN. CEMENT CONTENT	24 lb/ft³(380kg/m³)
MAX. W/C RATIO	0.40

C3 ALL CAST–IN–SITU CONCRETE SHALL HAVE A MINIMUM 28 DAYS CYLINDRICAL STRENGTH UNLESS NOTED OTHERWISE OR MENTIONED IN FOLLOWING TABLE: ALL STRENGTHS MENTLONED IN DRAWINGS ARE CYLINDRICAL.

ITEM	28 DAYS CYLINDRICAL STRENGTH (PSI)	CUBICAL STRENGTH
RAFT	3000	3750
RETAINING WALLS	3000	3750
COLUMNS	3000	3750
SHEAR WALLS	3000	3750
BEAMS	3000	3750
SLABS	3000	3750
LEAN	1280	1600
SITU	1600	2000

C4 WATER CEMENT RATIO SHALL NOT EXCEED 0.4.

C5 MAXIMUM POSSIBLE WATER–SOLUBLE CHLORIDE ION (CL) CONTENT IN CONCRETE SHALL NOT EXCEED 0.15% BY WEIGHT OF CEMENT.

C6 MAXIMUM SIZE OF COURSE AGGREGATE SHALL BE 25MM UNLESS NOTED OTHERWISE.

C7 CONTRACTOR SHALL GET APPROVAL FROM DESIGN CONSULTANT OF A CONCRETE MIX DESIGN.

C8 THE CONTRACTOR SHALL PERFORM AND SUBMIT FOR REVIEW INSTRUMENT SURVEYS OF FINISHED CONCRETE SLAB SURFACES, BOTH BEFORE AND AFTER REMOVAL OF FORM WORK AND/OR SHORING SYSTEM TO VERIFY AS–BUILT TOLERANCES.

C9 REFER TO SPECIFICATIONS FOR REQUIREMENTS OF CONCRETE SURFACE FINISH AND CASTING TOLERANCE.

C10 PROVIDE UPWARD CAMBER TO SLABS AND BEAMS AS NOTED ON STRUCTURAL DRAWINGS AND/OR SPECIFICATIONS CAMBER BOTH UNDERSIDE AND TOP OF CONCRETE TO MAINTAIN THE SLAB AND BEAM DEPTH SHOWN ON THE DRAWINGS UNLESS NOTED OTHERWISE.

C11 BEAMS, SLABS, COLUMNS, WALLS AND FOUNDATION ELEMENTS SHALL NOT BE SLEEVED OR BOXED–OUT OR HAVE THE REINFORCEMENT INTERRUPTED EXCEPT AS INDICATED ON THE STRUCTURAL DRAWINGS.

C12 ALL CONCRETE SHALL CONTAIN AN APPROVED WATER REDUCING, PLASTICIZING ADMIXTURE. APPROVED HIGH RANGE WATER REDUCING ADMIXTURE MAY BE UTILIZED AT THE CONTRACTOR'S OPTION. ALL CONCRETE PERMANENTLY EXPOSED TO WEATHER SHALL ALSO CONTAIN AN APPROVED AIR–ENTRAINING ADMIXTURE TO PROVIDE PERCENTAGE OF AIR REQUIRED FOR SEVERE EXPOSURE AS PER ACI 318.

C13 NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.

C14 THE FOLLOWING CONCRETE CLEAR COVER TO PRIMARY REINFORCEMENT SHALL BE PROVIDED, UNLESS LARGER COVER IS NOTED ON THE STRUCTURAL DRAWINGS.

ELEMENT	CONCRETE CLEAR COVER SCHEDULE	
	ABOVE GROUND INTERIOR ENVIRONMENT	ABOVE GROUND EXTERIOR ENVIRONMENT
COLUMNS(VERTICAL BARS)	1.5"	2"
BEAMS(LONGITUDINAL BARS)	1.5"	2"
WALLS	0.75"	1"
GRADE SLAB	0.75	2"
SUSPENDED SLAB	0.75"	1"
EQUIPMENT PAD	0.75	2"
WATER TANK	2"	2"

NOTE: – CLEAR COVER SHALL NOT BE LESS THAN ONE BAR DIA.
– CONCRETE COVER FOR SURFACE CAST AGAINST SOIL SHALL BE 3" AND FOR SURFACE INCONTACT WITH SOIL SHALL BE 2".

C11 AGGREGATE FOR CONCRETE SHALL BE FROM APPROVED SOURCE AND SHALL COMPLY WITH THE SPECIFICATION REQUIREMENTS.

C12 HORIZONTAL CONSTRUCTION JOINTS SHALL NOT BE MADE IN BEAMS UNLESS SHOWN OR REVIEWED BY DESIGN CONSULTANT. VERTICAL CONSTRUCTION JOINTS MAY BE MADE AT MIDSPAN OF BEAMS. OR SLABS HAVING NO POINT LOADS AT CENTER OF SPAN. UNLESS OTHERWISE NOTED OR SHOWN OR DIRECTED BY THE DESIGN CONSULTANT.

C13 ALL CONCRETE SHALL BE COMPACTED USING ONLY MECHANICAL VIBRATION PROCESS.

C14 ALL CONCRETE SHALL BE CURED IN ACCORDANCE WITH THE SPECIFICATIONS.

REINFORCEMENT

R1 ALL REINFORCING BARS SHALL BE DEFORMED BARS WITH YIELD STRENGTH OF 414MPa CONFORMING TO ASTM A615.

R2 EPOXY COATED REINFORCING BARS SHALL NOT BE PERMITTED.

R3 ALL REINFORCING BARS SHALL BE DETAILED, FABRICATED, LABELED, SUPPORTED, SPACED IN FORMS AND SECURED IN PLACE IN ACCORDANCE WITH THE PROCEDURES AND REQUIREMENTS OUTLINED IN THE CURRENT ACI 318 AND ACI 315 UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.

R4 ALL STARTER BARS SHALL BE SURVEYED AND LOCATION CONFIRMED IN AS–BUILT CONDITION PRIOR TO PLACING WALL/COLUMN REINFORCEMENT AND ANY DISCREPANCIES SHALL BE REPORTED TO THE DESIGN CONSULTANT FOR INSTRUCTIONS.

R5 PROVIDE STARTER BARS TO WALLS AND COLUMNS SIMILAR IN NUMBER AND SIZE AND SPACING TO THE VERTICAL BARS ABOVE UNLESS NOTED OTHERWISE.

R6 WELDING AND/OR SITE CUTTING OF THE REINFORCING BARS SHALL NOT BE PERMITTED UNLESS REVIEWED AND ACCEPTED BY THE DESIGN CONSULTANT.

R7 ALL PROPRIETARY FIXING SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

R8 ALL REINFORCING SPLICES SHALL BE CLASS B TENSION SPLICES IN ACCORDANCE WITH THE CURRENT ACI 318 UNLESS NOTED OTHERWISE. REFER TO SCHEDULE BELOW FOR SPLICE LENGTHS.

TENSION SPLICE LENGTH	
CLASS A	1.0X DEVELOPMENT LENGTH
CLASS B	1.3X DEVELOPMENT LENGTH

CLASS A = As PROVIDED ≥ 2 As REQUIRED AND PERCENTAGE As SPLIES < 50%

CLASS B = ALL OTHER CONDITIONS

R9 ALL WIRE MESH REINFORCEMENT SHALL BE LAPPED AT LEAST 2 MESH PANELS AND SECURELY TIED. ALL REINFORCING DEVELOPMENT LENGTHS SHALL BE TENSION DEVELOPMENT LENGTHS IN ACCORDANCE WITH THE CURRENT ACI 318 UNLESS NOTED OTHERWISE. REFER TO SCHEDULE BELOW.

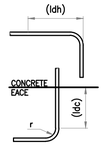
	TENSION DEVELOPMENT LENGTHS* FOR f'c= 2.5 ksi					
	#3	#4	#5	#6	#8	#10
CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN DIA OF BAR, AND BEAM STIRRUPS OR COLUMNS TIES THROUGHOUT SPACE LENGTH NOT LESS THAN THE CODE MINIMUM OR CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN TWICE THE DIA OF BAR, AND CLEAR COVER NOT LESS THAN DIA OF BAR	21"	27"	34"	39"	66"	83"
OTHER CASES	30"	40"	51"	60"	100"	148"

*ABOVE DEVELOPMENT LENGTH SHALL BE MULTIPLIED BY 1.3 WHERE HORIZONTAL REINFORCEMENT IS PLACED SUCH THAT MORE THEN 12in OF FRESH CONCRETE IS CAST BELOW.

	TENSION DEVELOPMENT LENGTHS* FOR f'c= 3.5 ksi					
	#3	#4	#5	#6	#8	#10
CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN DIA OF BAR, AND BEAM STIRRUPS OR COLUMNS TIES THROUGHOUT SPACE LENGTH NOT LESS THAN THE CODE MINIMUM OR CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN TWICE THE DIA OF BAR, AND CLEAR COVER NOT LESS THAN DIA OF BAR	17"	22"	28"	33"	32"	69"
OTHER CASES	25"	33"	41"	49"	82"	102"

*ABOVE DEVELOPMENT LENGTH SHALL BE MULTIPLIED BY 1.3 WHERE HORIZONTAL REINFORCEMENT IS PLACED SUCH THAT MORE THEN 12in OF FRESH CONCRETE IS CAST BELOW.

DEVELOPMENT LENGTHS FOR f'c= 3 ksi		
	TENSION HOOKS	COMPRESSION
#3	9"	9"
#4	11"	11"
#5	13"	13"
#6	17"	16"
#8	21"	21"
#10	27"	25"



DEVELOPMENT LENGTHS FOR f'c= 4 ksi		
	TENSION HOOKS	COMPRESSION
#3	7"	7"
#4	9"	9"
#5	12"	12"
#6	14"	14"
#8	17"	17"
#10	22"	22"

R10 MECHANICAL SPLICING OF LARGE DIAMETER BARS MAY BE ACCEPTABLE SUBJECT TO REVIEW BY THE DESIGN CONSULTANT

R11 FOR HOUSE KEEPING PADS AND FLOATING SLABS PROVIDE REINFORCEMENT IN ACCORDANCE WITH THE CURRENT ACI 318 UNLESS NOTED OTHERWISE OR SHOWN ON THE STRUCTURAL DRAWINGS.

CONSTRUCTION INSPECTION PROGRAM FOOTNOTES:

1. PROVIDE CONSTRUCTION INSPECTION, CONSTRUCTION TESTING, REPORTING AND COMPLIANCE PROCEDURES ACCORDING TO CHAPTER 17 OF THE UBC–97 BUILDING CODE.
2. PRIOR TO THE BEGINNING OF CONSTRUCTION, REVIEW THE CONSTRUCTION INSPECTION REQUIREMENTS WITH THE ARCHITECT, ENGINEER, BUILDING OFFICIAL, GENERAL CONTRACTOR AND CONSTRUCTION INSPECTORS.
3. DUTIES OF THE CONSTRUCTION INSPECTOR INCLUDE, BUT ARE NOT LIMITED TO:

A. OBSERVE THE WORK FOR CONFORMANCE WITH THE APPROVED DRAWINGS AND SPECIFICATIONS. BRING DISCREPANCIES TO THE IMMEDIATE ATTENTION OF THE GENERAL CONTRACTOR FOR CORRECTION, THEN, IF UNCORRECTED, TO THE ENGINEER AND TO TO THE BUILDING OFFICIAL.

B. FURNISH INSPECTION REPORTS FOR EACH INSPECTION TO THE BUILDING OFFICIAL, ARCHITECT,STRUCTURAL ENGINEER, GENERAL CONTRACTOR AND OWNER IN A TIMELY MANNER.

C. SUBMIT A FINAL REPORT STATING WHETHER THE WORK REQUIRING CONSTRUCTION INSPECTION WAS INSPECTED, AND WHETHER THE WORKS IN CONFORMANCE WITH THE APPROVED DRAWINGS AND SPECIFICATIONS.

4. DUTIES TO THE GENERAL CONTRACTOR INCLUDE, BUT ARE NOT LIMITED TO:

A. NOTIFY CONSTRUCTION INSPECTOR THAT WORK IS READY FOR INSPECTION AT LEAST 24 HOURS BEFORE INSPECTION IS REQUIRED.

B. MAINTAIN ACCESS TO WORK REQUIRING INSPECTION UNTIL IT HAS BEEN OBSERVED AND INDICATED TO BE IN CONFORMANCE BY THE CONSTRUCTION INSPECTOR AND APPROVED.

C. PROVIDE THE CONSTRUCTION INSPECTOR WITH ACCESS TO APPROVED DRAWINGS AND SPECIFICATIONS AT THE JOB SITE.

D. MAINTAIN JOB–SITE COPIES OF ALL REPORTS SUBMITTED BY THE CONSTRUCTION INSPECTOR.

5. DEFINITIONS:

A. CONTINUOUS INSPECTION: THE SPECIAL INSPECTOR IS OBSERVING THE WORK REQUIRING SPECIAL INSPECTION AT ALL TIMES.

B. PERIODIC INSPECTION: THE SPECIAL INSPECTOR IS ON SITE AS REQUIRED TO CONFIRM THAT THE WORK REQUIRING SPECIAL INSPECTION IS IN CONFORMANCE.

STRUCTURAL STEEL :

SS1 MATERIALS :
1– ALL STRUCTURAL STEEL SHALL BE 36 ksi STRENGTH PRIME GRADE QUALITY HOT ROLLED MILD STEEL CONFORMING TO ASTM–A36 OR EQUIVALENT.
2– ALL NUTS & BOLTS SHALL CONFORM TO ASTM–A325 OR A490 ALL NUTS ARE ASTM–A563 & ALL WASHERS ARE ASTM–F436 OR EQUIVALENT & ANCHOR BOLTS ASTM–A307.
3– ALL WELDING SHALL BE CARRIED OUT USING E70XX TYPE ELECTRODES MADE BY PAKISTAN OXYGEN OR EQUIVALENT.

SS2 FABRICATION :
1– CONTRACTOR SHALL PREPARE AND SUBMIT SHOP DRAWINGS FOR APPROVAL BY THE ENGINEER & SHOP FABRICATION DETAILS BASED ON THESE STRUCTURAL DRAWINGS. THE SHOP DETAILS OF EACH PART SHALL SHOW CUT LENGTH, WELD DETAILS, BOLTS HOLE LOCATIONS ETC.

SS3 WELDING :
1– WELDING SHALL BE DONE BY LICENSED WELDER.
2– ALL WELDS SHALL BE CONTINUOUS ALL AROUND WITH FULL RETURNS AT ENDS
3– WELD LENGTHS ALONG THE LONGITUDINAL AXIS OF THE MEMBER SHALL BE SUFFICIENT TO DEVELOP THE FULL WORKING FORCE OF THE MEMBER.
4– ALL EXPOSED STRUCTURAL STEEL SURFACES INCLUDING NUTS & BOLTS TO BE PAINTED WITH TWO COATS OF LEAD PRIMER & TWO COATS OF RED OXIDE AFTER WIRE BRUSHING
5– ALL WELDING WORK SHALL CONFIRM TO THE AWS D1.1 "STRUCTURAL WELDING CODE – STEEL, "2003, AND SHALL BE PERFORMED BY AWS CERTIFIED WELDERS, OR EQUIVALENT BRITISH STANDARD WELDING QUALIFICATIONS.
6– MINIMUM FILLET WELD SIZES SHALL COMPLY WITH THE AISC SPECIFICATION REQUIREMENTS, BUT SHALL NOT BE LESS THAN 6MM, UNLESS NOTED OTHERWISE.

SS4 ERECTION AND INSTALLATION (GUIDE ONLY) :
1– PROVIDE ANCHOR BOLTS, ETC IN R/C WORKS ACCURATELY WITH THE HELP OF "TEMPLATES" AT THE TIME OF CONCRETING & CHECK LOCATION BEFORE FABRICATION.
2– PROVIDE SHOP DRAWINGS SHOWING EXACT CUT LENGTHS IDENTIFICATION MARKS OF PIECES ETC FOR APPROVAL TO THE ENGINEER.
3– ADEQUATE SCAFFOLDING, PLATFORMS, WINCHES ETC SHALL BE PROVIDE AT SITE DURING INSTALLATION OF MEMBERS TEMPORARY BRACINGS AND SCAFFOLDS SHALL BE IMMEDIATELY PROVIDE TO HOLD THE BEAMS IN POSITION, INSTALLATION OF SECONDARY BRACING AND PURLINS ETC SHALL FOLLOW.
4– DO NOT REMOVE THE TEMPORARY SHORING TILL ALL THE BRACINGS AND PURLINS ARE INSTALLED.

SS5 MISCELLANEOUS :
1– THE STRUCTURAL STEEL SYSTEMS HAVE BEEN DESIGNED PER AISC LRFD (LOAD AND RESISTANCE FACTOR DESIGN), ALL CONTRACTOR ALTERNATIVE DESIGNS SHALL MEET THESE RESPECTIVE DESIGN CRITERIA.
2– ALL WELDING WORK SHALL CONFORM TO THE AWS D1.1 "STRUCTURAL WELDING CODE – STEEL, "2003, AND SHALL BE PERFORMED BY AWS CERTIFIED WELDERS, OR EQUIVALENT BRITISH STANDARD WELDING QUALIFICATIONS.
3– ALL STRUCTURAL STEEL SHALL BE EPOXY PAINTED AS PER SPECIFICATION.
4– THE CONTRACTOR SHALL SUBMIT DETAILED, ENGINEERED, COORDINATED, AND CHECKED SHOP DRAWINGS FOR ALL STRUCTURAL STEEL TO THE CONSULTANT FOR REVIEW PRIOR TO THE START OF FABRICATION AND / OR ERECTION.
5– THE CONTRACTOR SHALL ENGAGE A QUALIFIED STRUCTURAL STEEL MATERIALS TESTING AGENCY, ACCEPTABLE TO THE OWNER TO CONTINUOUSLY PERFORM ALL REQUIRED SHOP FABRICATION AND FIELD ERECTION, TESTING (VISUAL, MAGNETIC PARTICLE AND ULTRASONIC) AND INSPECTIONS. TESTING REGIME SHALL BE AS APPROVED BY THE CONSULTANT.
6– ALL WELDS SHALL BE VISUALLY INSPECTED 100% PER AWS D1.1. WELD SIZE AND CONFIGURATION MEASUREMENTS SHALL BE PERFORMED FOR A MINIMUM OF 15% OF ALL WELDS ON A RANDOM BASIS X–RAY TESTING SHALL ALSO BE PERFORMED ON MINIMUM 25% OF WELDS RANDOMLY.
7– 100% OF ALL BOLTED CONNECTIONS SHALL BE VISUALLY INSPECTED, AND THEN TESTED WITH A CALIBRATED TORQUE WRENCH TO VERIFY A MINIMUM OF 25% OF BOLTS IN EACH CONNECTION (2 BOLTS PER CONNECTION MINIMUM)
8– THE STRUCTURAL STEEL FABRICATOR AND ERECTOR SHALL SCHEDULE ALL WORK TO ALLOW THE ABOVE INSPECTION AND TESTING REQUIREMENTS TO BE COMPLETED.
9– THERE SHALL BE NO FIELD WELDING OF STEEL MEMBERS ALLOWED WITHOUT PRIOR REVIEW BY THE CONSULTANT.
10– ALL STEEL STRUCTURES SHALL BE HOT DIP GALVANIZED WITH MINIMUM 70 MICRONS ZINC COATING.

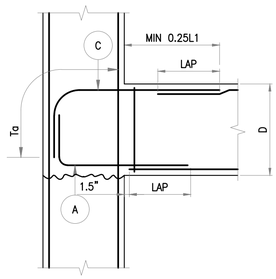
SS6 ALL STRUCTURAL STEEL UNDER CONSTRUCTION TO BE DESIGNED BY THE CONTRACTOR ACCORDING TO PERFORMANCE CRITERIA GENERAL NOTES AND BOQ OF THE TENDER DOCUMENT.

A1. GENERAL ABBREVIATIONS

APPROX–	APPROXIMATELY	LG	– LONG	S.S.L.–	STRUCTURAL SLAB LEVEL
BP	– BASE POINT	M	– METRE	STD	– STANDARD
CHAM	– CHAMFERED	MAX	– MAXIMUM	TBC	– TO BE CONFIRMED
CJ	– CONSTRUCTION JOINT	MIN	– MINIMUM	THK	– THICKNESS
CONC	– CONCRETE	MJ	– MOVEMENT JOINT	TJ	– TRANSVERSE JOINT
DEG	– DEGREES	IN	– INCHES	TW	– THICKNESS OF WALL
DIA	– DIAMETER	No	– NUMBER	TYP	– TYPICAL
D	– DEPTH	NOM	– NOMINAL	UNO	– UNLESS NOTED OTHERWISE
DWG	– DRAWING	NTS	– NOT TO SCALE	W	– WIDE
EGL	– EXISTING GROUND LEVEL	P/O	– PERMANENT OPENING	P.L	– PLINTH LEVEL
EJ	– EXPANSION JOINT	RAD	– RADIUS	BOF	– BOTTOM OF FOOTING
EXTG	– EXISTING	RC	– REINFORCED CONCRETE	SOG	– SLAB ON GRADE
FFL	– FINISHED FLOOR LEVEL	REF	– REFER		
FGL	– FINISHED GROUND LEVEL	REQD	– REQUIRED		
GA	– GENERAL ARRANGEMENT	REV	– REVISION		
GL	– GROUND LEVEL	SOP	– SETTING OUT POINT		
GWT	– GROUND WATER TABLE	SQ	– SQUARE		
IJ	– ISOLATION JOINT				

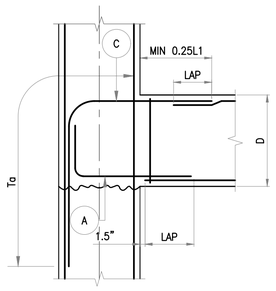
A2. REINFORCEMENT ABBREVIATIONS

ABR	–	ALT. BARS REVERSED
ABS	–	ALT. BARS STAGGERED
ALT	–	ALTERNATE
B	–	BOTTOM
CRS	–	CENTRES
EF	–	EACH FACE
EW	–	EACH WAY
EXTF	–	EXTERNAL FACE
FF	–	FAR FACE
H	–	HORIZONTAL
INTF	–	INTERNAL FACE
NF	–	NEAR FACE
PRS	–	PAIRS
REINF	–	REINFORCEMENT
STG	–	STAGGERED
T	–	TOP
T/O	–	TEMPORARY OPENING
To

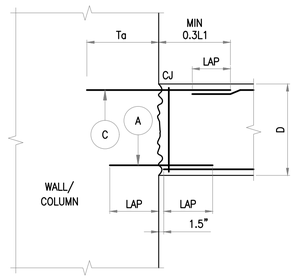


NOTE:
TYPE–1 : Ta TO BE ACHEIVED WITHIN BEAM DEPTH WITH L–BAR (EDGE COLUMN)

Ta – TENSION ANCHORAGE



TYPE–2 : Ta TO BE ACHEIVED BY ANCHORING L–BARS INTO COLUMN. (Ta CANNOT BE ACHEIVED WITHIN BEAM DEPTH) (EDGE COLUMN)



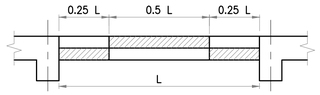
TYPE–3 : Ta TO BE ACHEIVED BY STRAIGHT BARS (LONG COLUMNS / WALLS)

NOTES :-

2. TO AVOID EXCESSIVE LAPPING THE CONTRACTOR MAY PROPOSE ALTERNATIVE REINFORCEMENT ARRANGEMENTS FOR CONTINUOUS BEAMS FOR THE ENGINEER'S APPROVAL. THE ALTERNATIVE ARRANGEMENTS MUST NOT RESULT IN LESSER REINFORCEMENT BEING PROVIDED IN ANY LOCATION THAN THAT INDICATED IN THE BEAM SCHEDULE.
3. CONTRACTOR MAY PROPOSE ALTERNATIVE DETAILING FOR CONTINUOUS BEAMS FOR CONSIDERING REINFORCEMENT TO RUN CONTINUOUSLY ACROSS BEAM / COLUMN JUNCTION UTILIZING THE MAXIMUM LENGTH OF BAR AS MUCH AS POSSIBLE. LAPS WHERE REQUIRED SHOULD BE PROVIDED ONLY AT THE LOCATIONS SHOWN ON THE TYPICAL DETAILS.
4. FOR DETAILS OF BARS MARKED THUS (A), (B), (C) ETC. SEE BEAM SCHEDULES.
5. MAXIMUM CLEAR DISTANCE BETWEEN LONGITUDINAL BARS = 6" UNLESS SCHEDULED OTHERWISE.
6. SIDE REINFORCEMENT FOR ALL BEAMS DEEPER THAN 2'–6" (OVERALL) UNO

WIDTH OF BEAM	SIDE REFT
8"	#4@10"
12"	#4@8"
16"	#4@6"
21" OR GREATER THAN 21"	#5@8"

7. WHERE REFT IS TO BE DETAILED CONTINUOUSLY, LAPS IN REFT MAY OCCUR ONLY IN SHADED AREAS SHOWN BELOW:



C LAP LOCATIONS
SCALE N.T.S

A DETAILS OF COLUMN BEAM INTERSECTIONS
SCALE N.T.S

1 IN SPAN
SCALE N.T.S

2 AT SUPPORT CASE-1
SCALE N.T.S

3 AT SUPPORT CASE-2
SCALE N.T.S

4 AT SUPPORT CASE-3
SCALE N.T.S

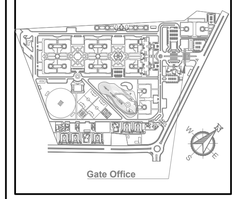
NOTE:
1. COLUMN REINFORCEMENT OMITTED FOR CLARITY

B BEAM STEP DETAILS
SCALE N.T.S

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG.2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

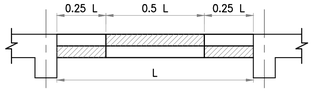
Building Name:
GATE HOUSE

Drawing Title :
STANDARD DETAILS (SHEET 1 OF 5)

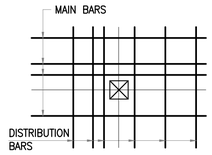
Designed :	Checked :	Approved :
R.A	M.L	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-STD-S-0011

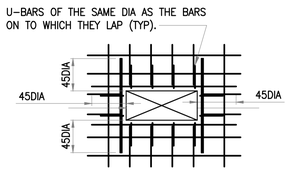
Last Save: Saeed.ahmed Date: Tuesday, August 27, 2024



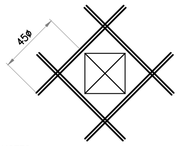
A – LAP LOCATIONS
SCALE N.T.S



B – OPENINGS MORE THAN 6"
SCALE N.T.S
BARS MAY BE DISPLACED NO ADDITIONAL REINF. NECESSARY

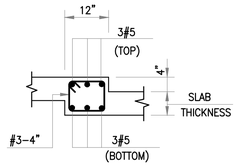


C – OPENINGS MORE THAN 6" AND LESS THAN 18"
SCALE N.T.S
CUT BARS INTERUPTED BY HOLE. PROVIDE TRIMMER BARS OF SAME DIA. TYPE & NUMBER AS CUT BARS

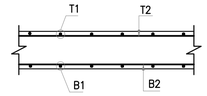


NOTES:
1. ALL REPLACEMENT AND DIAGONAL BARS SHOULD EXTEND AN ANCHORAGE LENGTH BEYOND THE EDGE OF THE HOLE.
2. HOLES LARGER THAN 36" IN ANY DIRECTION ARE DETAILED ON THE DRAWINGS

D – OPENINGS MORE THAN 18" AND LESS THAN 36"
SCALE N.T.S
PROVIDE TRIMMER BARS AS PREVIOUS DETAIL IN ADDITION PROVIDE DIAGONAL TRIMMER OF SAME DIA, TYPE & NUMBER AS PREVIOUS DETAIL TRIMMERS.

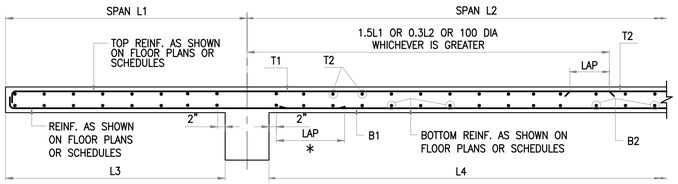


E – TYP. SECTION OF FOLD AT SUNK SLAB
SCALE N.T.S

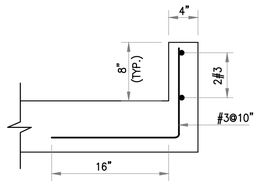


T1 DENOTES FIRST (OUTERMOST) LAYER OF TOP REINF. T2 DENOTES SECOND LAYER TOP REINF.
B1 DENOTES FIRST (OUTERMOST) LAYER OF BOTTOM REINF. B2 DENOTES SECOND LAYER OF BOTTOM REINF.. ETC

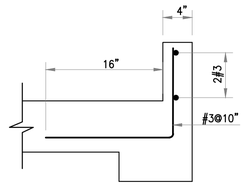
F – NOTATION FOR PLACEMENT OF REINFORCEMENT
SCALE N.T.S



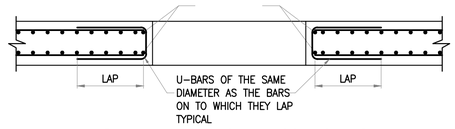
G – CANTILEVER SLAB
SCALE N.T.S
MULTIPLE LAYERS OF REINF. ARE NUMBERED IN ASCENDING ORDER FROM THE OUTERMOST LAYER INWARDS AS SHOWN BELOW:



1 – UPSTAND FROM SLAB
SCALE N.T.S



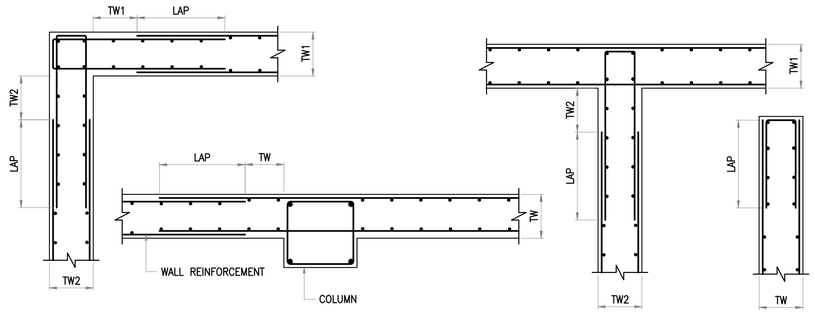
2 – UPSTAND FROM BEAM
SCALE N.T.S



I – TRIMMING OF OPENINGS IN SLABS
SCALE N.T.S

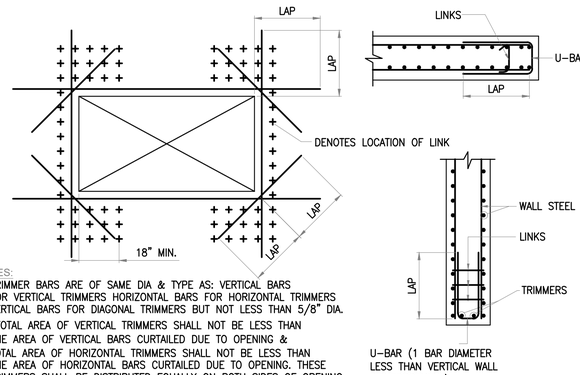
H – TYPICAL OPENING UPSTAND REINFORCEMENT DETAIL
SCALE N.T.S

TRIMMER BARS



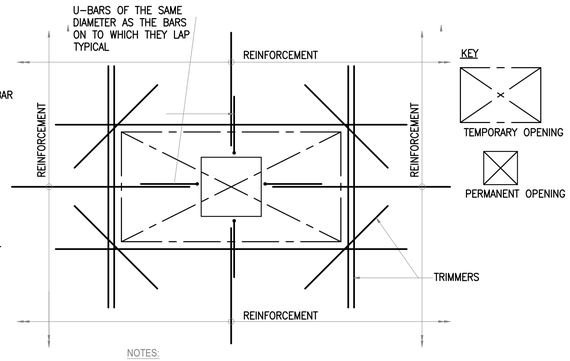
NOTES:
1. TW, TW1 & TW2 ARE WALL THICKNESSES

J – WALL JUNCTION DETAILS
SCALE N.T.S



NOTES:
1. TRIMMER BARS ARE OF SAME DIA & TYPE AS: VERTICAL BARS FOR VERTICAL TRIMMERS HORIZONTAL BARS FOR HORIZONTAL TRIMMERS VERTICAL BARS FOR DIAGONAL TRIMMERS BUT NOT LESS THAN 5/8" DIA.
1A. TOTAL AREA OF VERTICAL TRIMMERS SHALL NOT BE LESS THAN THE AREA OF VERTICAL BARS CURTAILED DUE TO OPENING & TOTAL AREA OF HORIZONTAL TRIMMERS SHALL NOT BE LESS THAN THE AREA OF HORIZONTAL BARS CURTAILED DUE TO OPENING. THESE TRIMMERS SHALL BE DISTRIBUTED EQUALLY ON BOTH SIDES OF OPENING
2. LINKS SHALL BE #3 BARS AND SHALL CONFORM WITH THE SPACING OF WALL REINFORCEMENT, BUT SPACING NOT TO EXCEED 8"
3. THIS DETAIL APPLIES TO OPENINGS >10".

K – TRIMMING OF HOLES IN WALLS
SCALE N.T.S



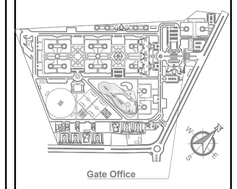
NOTES:
1. TRIMMERS ARE FIXED TO TEMPORARY OPENING (BOXOUT) DIMENSIONS.
2. REINFORCEMENT TERMINATES AT PERMANENT OPENING. IF PERMANENT OPENING IS OMITTED THEN REINFORCEMENT IS CONTINUOUS THROUGHOUT UNO.

L – DETAIL WHERE TEMPORARY & PERMANENT OPENINGS ARE CONCURRENT
SCALE N.T.S

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG.2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

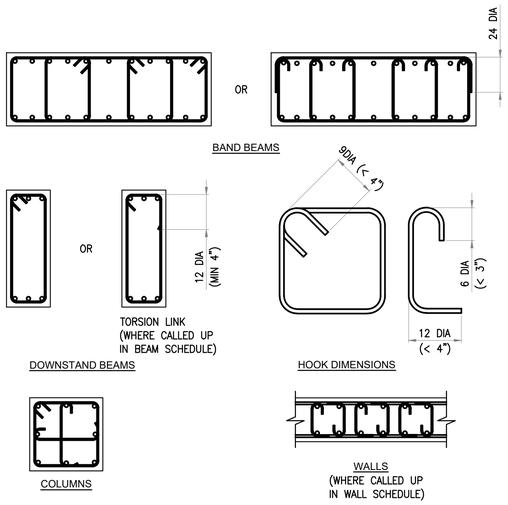
Building Name:
GATE HOUSE

Drawing Title :
STANDARD DETAILS (SHEET 2 OF 5)

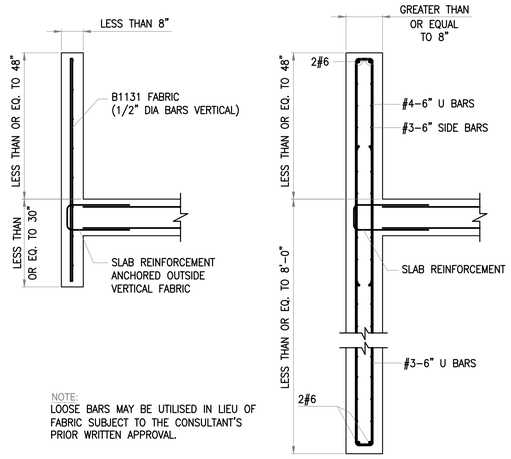
Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-STD-S-0012

Last Save: Saeed.ahmed Date: Monday, August 26, 2024

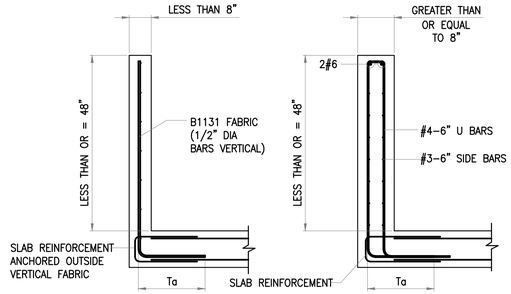


A TYPICAL LINK SHAPES
SCALE N.T.S



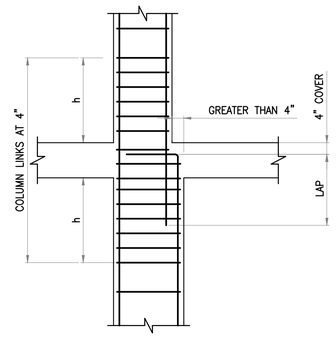
NOTE:
LOOSE BARS MAY BE UTILISED IN LIEU OF FABRIC SUBJECT TO THE CONSULTANT'S PRIOR WRITTEN APPROVAL.

B UPSTAND/DOWNSTAND REINFORCEMENT
SCALE N.T.S



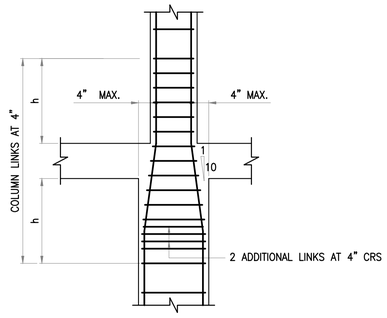
NOTE:
LOOSE BARS MAY BE UTILISED IN LIEU OF FABRIC SUBJECT TO THE CONSULTANT'S PRIOR WRITTEN APPROVAL.

C UPSTAND REINFORCEMENT
SCALE N.T.S



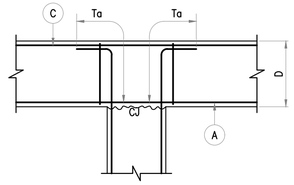
SYMMETRICAL COLUMN JUNCTION
SHOWN WITH STEP GREATER THAN 4"
D SCALE N.T.S

NOTE:
WHERE STEP IS 4" OR LESS CRANKED BARS MAY BE USED SIMILAR TO DETAIL B



SYMMETRICAL COLUMN JUNCTION
SHOWN WITH STEP 4" OR LESS
E SCALE N.T.S

NOTE:
1. WHERE STEP IS GREATER THAN 4" BARS FROM LARGER COLUMN TO BE BENT AT 90° AND TERMINATED AS SHOWN IN DETAIL 1.

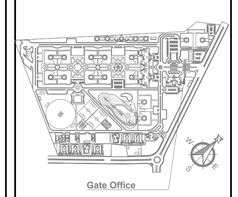


COLUMN BEAM JUNCTION DETAIL
SHOWN WITH STEP 4" OR LESS
F SCALE N.T.S

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG.2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

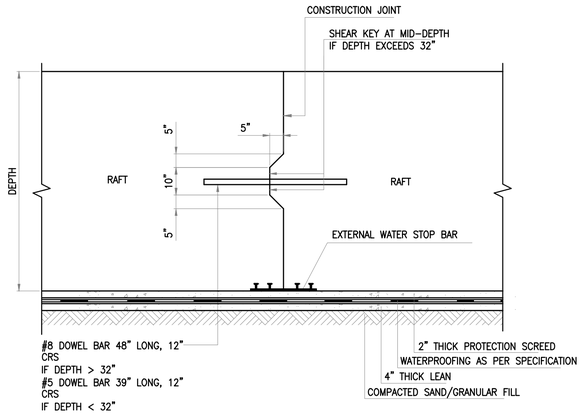
Building Name:
GATE HOUSE

Drawing Title :
STANDARD DETAILS
(SHEET 3 OF 5)

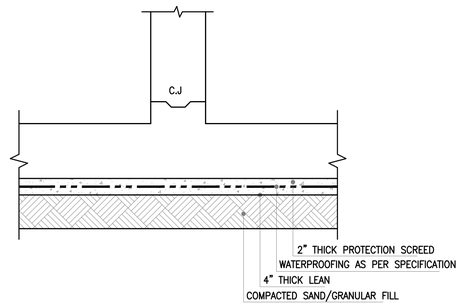
Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-STD-S-0013

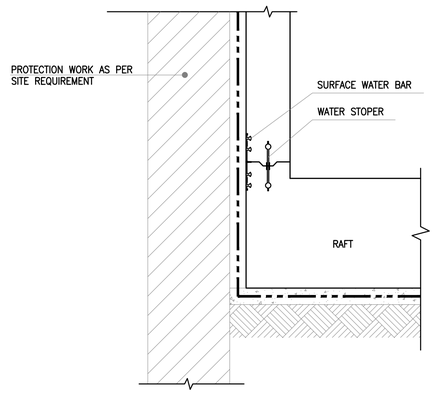
Last Save: Saeed.ahmed Date: Monday, August 26, 2024



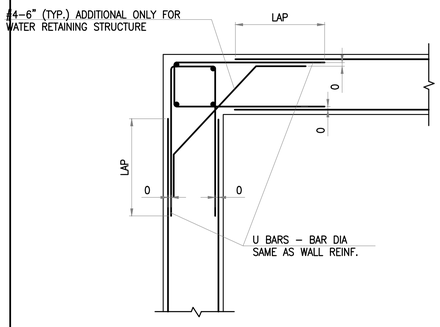
A DETAIL OF CONSTRUCTION JOINT IN RAFT
SCALE N.T.S



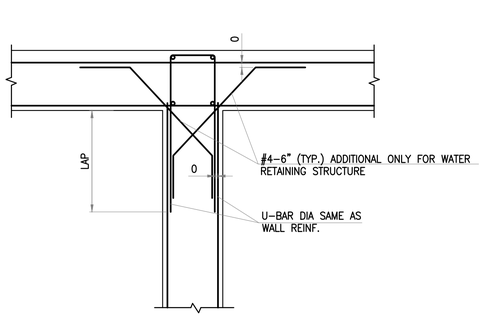
B WATER PROOFING DETAIL FOR LIFT FOUNDATION
SCALE N.T.S



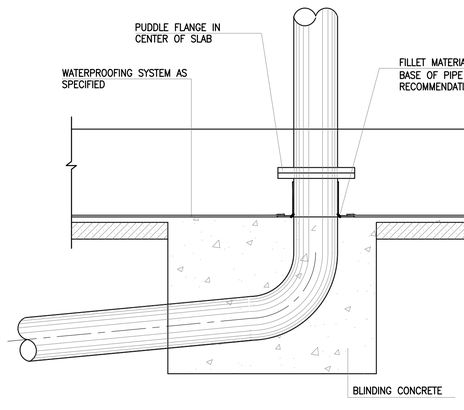
C TYPICAL WATER STOPER DETAIL
SCALE N.T.S

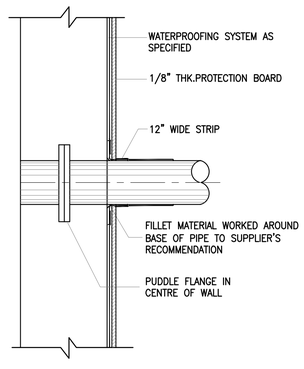


D TYPICAL CORNER DETAIL FOR WATER TANK WALL U.N.O
SCALE N.T.S

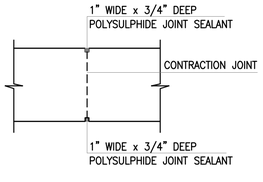


E TYPICAL INTERSECTION DETAIL FOR WATER TANK WALL U.N.O
SCALE N.T.S





F TYPICAL SERVICE ENTRY DETAIL IN FOUNDATION / WALL / SLAB
SCALE N.T.S



G TYPICAL CONTRACTION JOINT PLAN
SCALE N.T.S

Client :

Sindh Madressatul Islam University

Consultant :

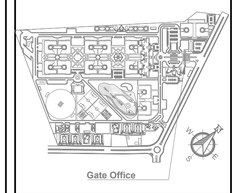
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:

Rev. No.	DATE	DESCRIPTION
0	AUG.2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status: CONSTRUCTION

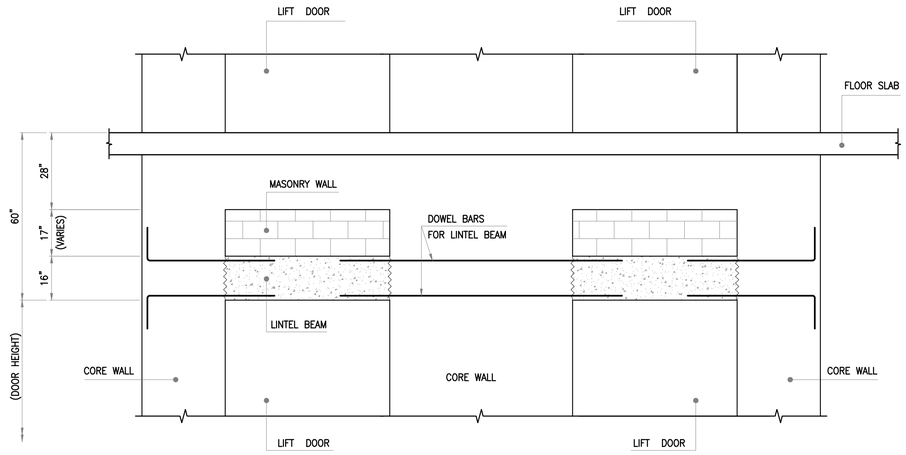
Building Name: GATE HOUSE

Drawing Title : STANDARD DETAILS (SHEET 4 OF 5)

Designed :	Checked :	Approved :
R.A	M.L	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

Drawing No. : EA-00986-STD-S-0014

Last Save: Saeed.ahmed Date: Monday, August 26, 2024



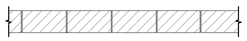
TYPICAL DETAIL OF LINTEL BEAM OVER LIFT DOOR OPENINGS
B / - SCALE N.T.S

SCHEDULE OF LINTELS UNO.

CLEAR SPAN WIDTH	LINTEL SIZE		REINFORCEMENT		
	WIDTH	DEPTH	A	B	LINKS
3'-0"	8"	6"	2#4	2#4	#3-5"
5'-0"	8"	8"	2#4	2#4	#3-5"
6'-6"	8"	10"	2#5	2#4	#3-5"
8'-0"	8"	12"	2#5	2#4	#3-5"

NOTES:

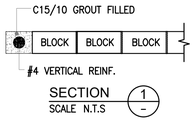
1. BEARING ON BLOCK WALL ON EITHER SIDE OF OPENING SHALL BE AT LEAST EQUAL TO THE OVERALL DEPTH OF THE LINTEL.
2. OVERALL LINTEL DEPTHS COULD BE INCREASED TO SUIT BLOCK-WORK COURSING.



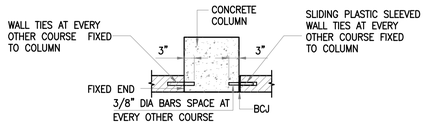
TYPICAL BED JOINT REINFORCEMENT DETAIL
C / - SCALE N.T.S

NOTES:-

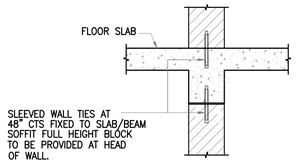
1. WALL TIES TO BE PLACED AT16" VERTICAL SPACING 39" HORIZONTAL SPACING (STAGGERED)
2. ALL DETAILS SHOWN ARE FOR NON LOAD BEARING BLOCK WORK (UNO).



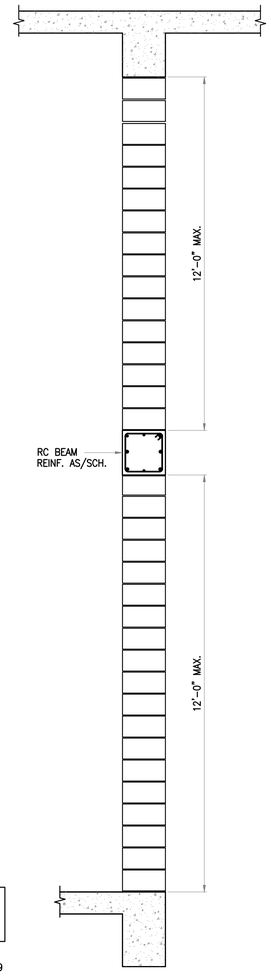
SECTION 1 / -
SCALE N.T.S

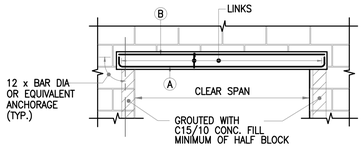


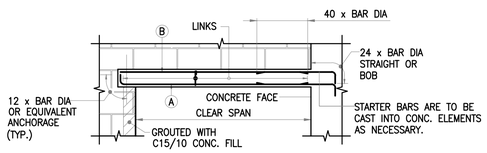
TYPICAL OUTER COLUMN AND EXTERNAL BLOCK WORK JOINT DETAIL
F / - SCALE N.T.S



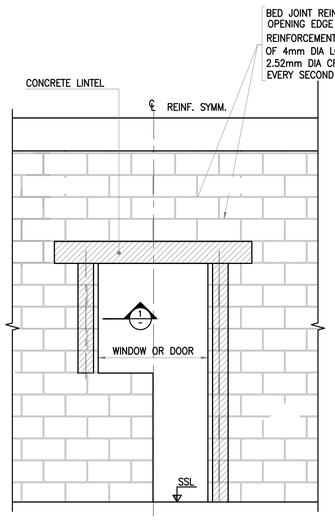
DETAIL A / - SCALE N.T.S
TYPICAL BLOCK WORK TO UNDERSIDE OF BEAM



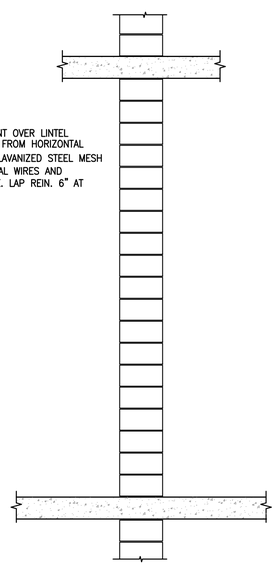




TYPICAL STANDARD LINTELS
D / - SCALE N.T.S
(NON LOAD BEARING BLOCK WALLS)

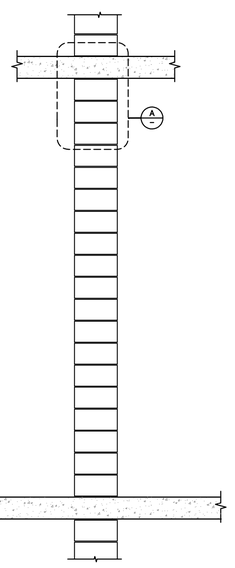


TYPICAL BLOCK WORK DETAIL
E / - SCALE N.T.S



NOTE : DESIGN AND WORKMANSHIP OF ALL CONCRETE MASONRY WORK TO COMPLY WITH ACI 530-99/ASCE 5-99/TMS 402-99 AND SPECIFICATIONS.

DETAIL OF SINGLE HEIGHT INTERNAL MASONRY WALL TO SLAB CONNECTION
G / - SCALE N.T.S



NOTE : ALL EXTERNAL WALLS TO BE ANCHORED TO R.C MEMBERS AT TOP, BOTTOM

NOTE : DESIGN AND WORKMANSHIP OF ALL CONCRETE MASONRY WORK TO COMPLY WITH ACI 530-99/ASCE 5-99/TMS 402-99 AND SPECIFICATIONS.

DETAIL OF SINGLE HEIGHT EXTERNAL MASONRY WALL TO SLAB CONNECTION
H / - SCALE N.T.S

DETAIL OF DOUBLE HEIGHT MASONRY WALL TO SLAB CONNECTION
J / - SCALE N.T.S

Client :

Sindh Madressatul Islam University

Consultant :

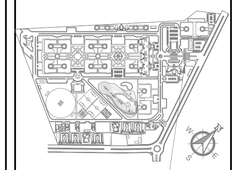
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1625
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:

Rev. No.	DATE	DESCRIPTION
0	AUG.2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status: CONSTRUCTION

Building Name: GATE HOUSE

Drawing Title : STANDARD DETAILS (SHEET 5 OF 5)

Designed :	Checked :	Approved :
R.A	M.L	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code : 00986		Rev. : 0

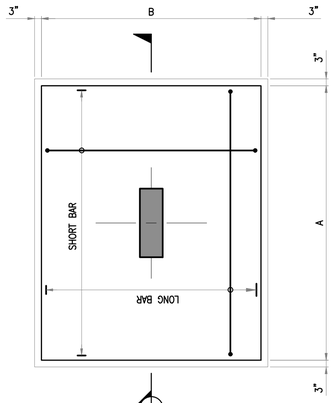
Drawing No. EA-00986-STD-S-0015

Last Save: Saeed.ahmed Date: Monday, August 26, 2024

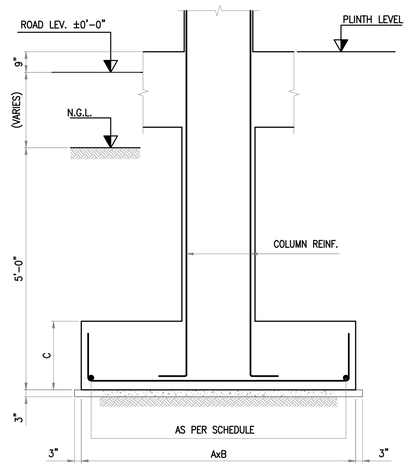
SCHEDULE OF FOOTING

S.NO.	FOOTING	FOOTING SIZE		FOOTING THICK	BOTTOM REINFORCEMENT		TOP REINFORCEMENT		REMARKS
		A	B	C	SHORT BAR	LONG BAR	SHORT BAR	LONG BAR	
1	F1	8'-0"	6'-0"	18"	#4@5"C/C.	#4@5"C/C.	–	–	

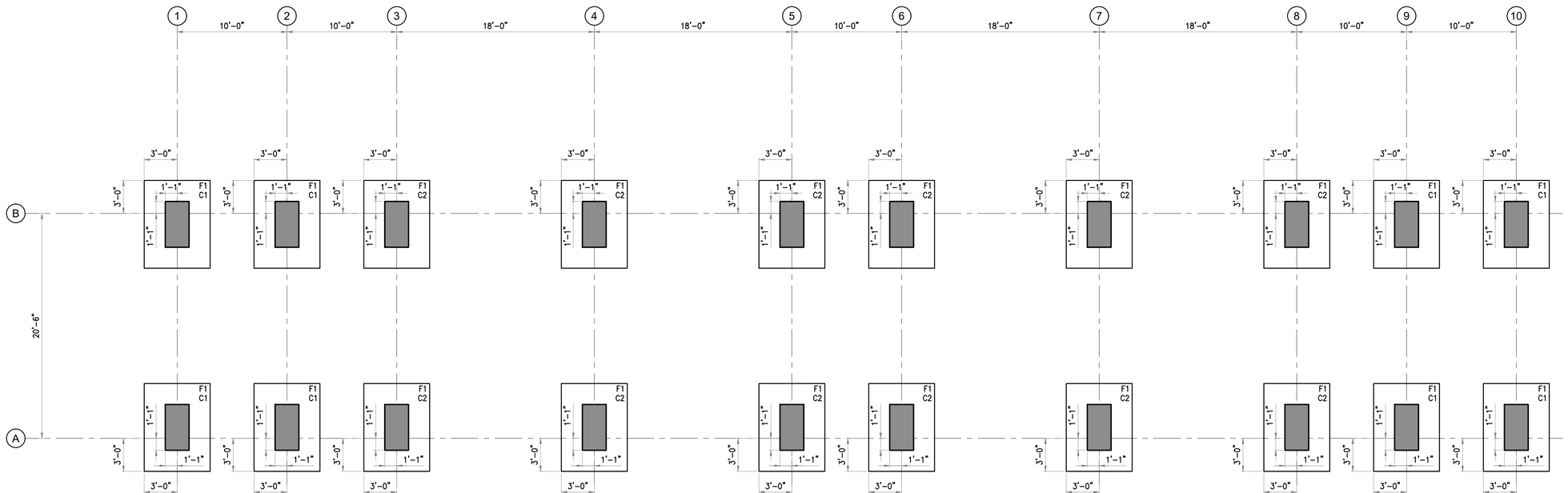
NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. FOUNDATION LAYOUT PLAN MUST BE READ IN CONJUNCTION WITH FOOTING SCHEDULE.
5. FOR COLUMN SCHEDULE REFER EA-00986-SMGO-S-1002 .
6. ALL FOUNDATION ARE DESIGNED ON NET ALLOWABLE BEARING CAPACITY OF 3TSF AT A DEPTH OF 5 FEET (MIN.) BELOW NGL AS PER THE SOIL REPORT.
7. ALL CAST-IN-SITU CONCRETE SHALL HAVE MINIMUM 28 DAYS CYLINDRICAL COMPRESSIVE STRENGTH fc' FOR:
   COLUMNS/RCC WALLS/WATER RETAINING STRUCTURES = 3000 PSI
   FOUNDATIONS = 3000 PSI
   BEAMS/SLABS/STAIRS = 3000 PSI



B – TYPICAL DETAIL OF FOOTING
SCALE 3/8"=1'



SECTION 1 –
SCALE 3/8"=1'

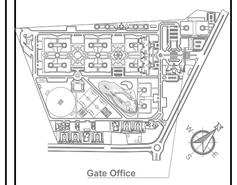


A – FOUNDATION LAYOUT PLAN
SCALE 3/16"=1'

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1525
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

Building Name:
GATE HOUSE

Drawing Title :
COLUMN & FOUNDATION LAYOUT PLAN AND DETAILS

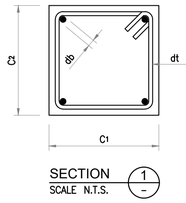
Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D.	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-S-1001

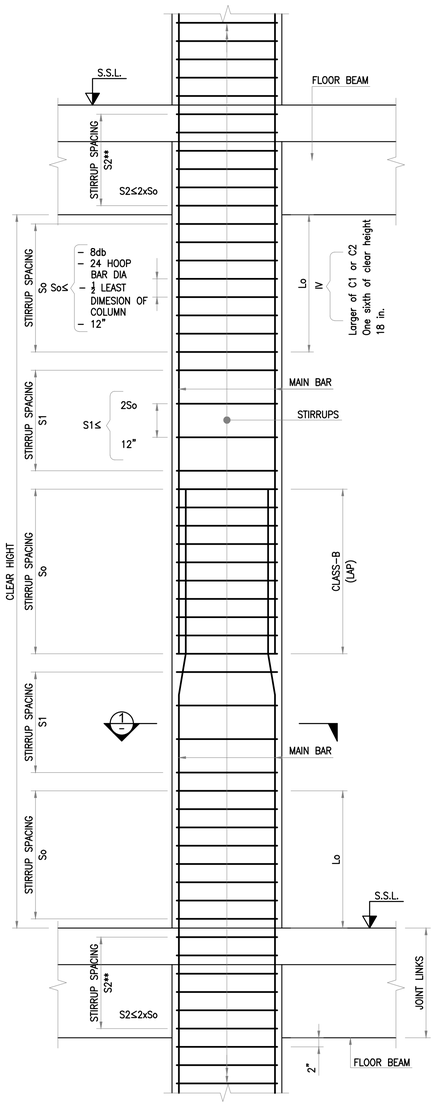
Last Save: Saeed.ahmed Date: Tuesday, August 27, 2024

NOTES:–
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S–0001, S–0011 TO S–0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET–INCHES UNITS.
4. FOR COLUMN MARK REFER EA–00986–SMGO–S–1001.
5. SITU UNDER PLINTH BEAMS VARIES AS PER SITE LAYOUT AND EXISTING GROUND LEVELS.
6. FOR COLUMN LAYOUT REFER COLUMN LAYOUT PLAN.
7. ALL CAST–IN–SITU CONCRETE SHALL HAVE MINIMUM 28 DAYS CYLINDRICAL COMPRESSIVE STRENGTH fc' FOR:

COLUMNS/RCC WALLS/WATER RETAINING STRUCTURES	=	3000 PSI
FOUNDATIONS	=	3000 PSI
BEAMS/SLABS/STAIRS	=	3000 PSI



SECTION 1 – SCALE N.T.S.



D – TYP. ELEVATION OF COLUMN
SCALE N.T.S.

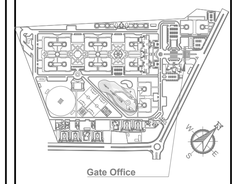
* COLUMN LINKS ARE SPECIFIED AS NO @ So/S (Lo)
** S2≤3db FOR ALL EXTERIOR COLUMNS, WHERE db IS DIA OF HOOK BAR.

		C1	C2
TOR ROOF LEVEL TO ROOF LEVEL	fc' = 3125 psi	–	4'–0" × 2'–0" 28–#6 4–#3@6"/9"/6"c/c LINKS
ROOF LEVEL TO PLINTH LEVEL	fc' = 3125 psi	4'–0" × 2'–0" 28–#6 4–#3@6"/9"/6"c/c LINKS	4'–0" × 2'–0" 28–#6 4–#3@6"/9"/6"c/c LINKS
PLINTH LEVEL TO FOUNDATION	fc' = 3125 psi	4'–2" × 2'–2" 28–#6 4–#3@6"/9"/6"c/c LINKS	4'–2" × 2'–2" 28–#6 4–#3@6"/9"/6"c/c LINKS
COLUMN ID		C1	C2

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status: CONSTRUCTION

Building Name: GATE HOUSE

Drawing Title : COLUMN SCHEDULE AND DETAILS

Designed :	Checked :	Approved :
R.A	M.L	A.K.M
Drawn :	Date :	Scale / Sheet :
M.S	May,2018	AS SHOWN

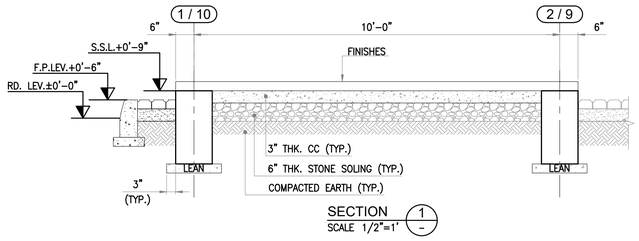
Project Code : 00986 | Rev. : 0

Drawing No. : EA-00986-SMGO-S-1002

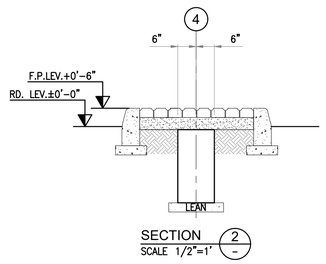
Last Save: Saeed.ahmed Date: Tuesday, August 27, 2024

NOTES:–
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S–0001, S–0011 TO S–0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET–INCHES UNITS.
4. FOR COLUMN LAYOUT REFER COLUMN LAYOUT PLAN.
5. ALL CAST–IN–SITU CONCRETE SHALL HAVE MINIMUM 28 DAYS CYLINDRICAL COMPRESSIVE STRENGTH fc' FOR:

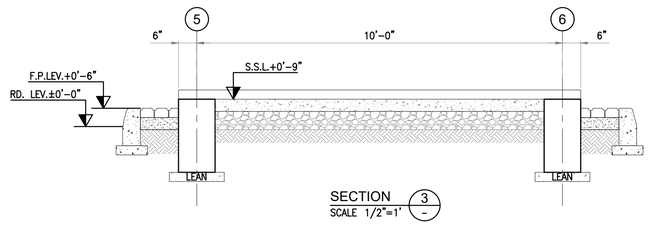
COLUMNS/RCC WALLS/WATER RETAINING STRUCTURES	=	3000 PSI
FOUNDATIONS	=	3000 PSI
BEAMS/SLABS/STAIRS	=	3000 PSI



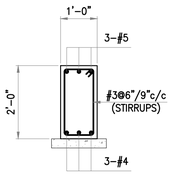
SECTION 1/– SCALE 1/2"=1'



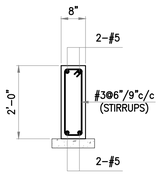
SECTION 2/– SCALE 1/2"=1'



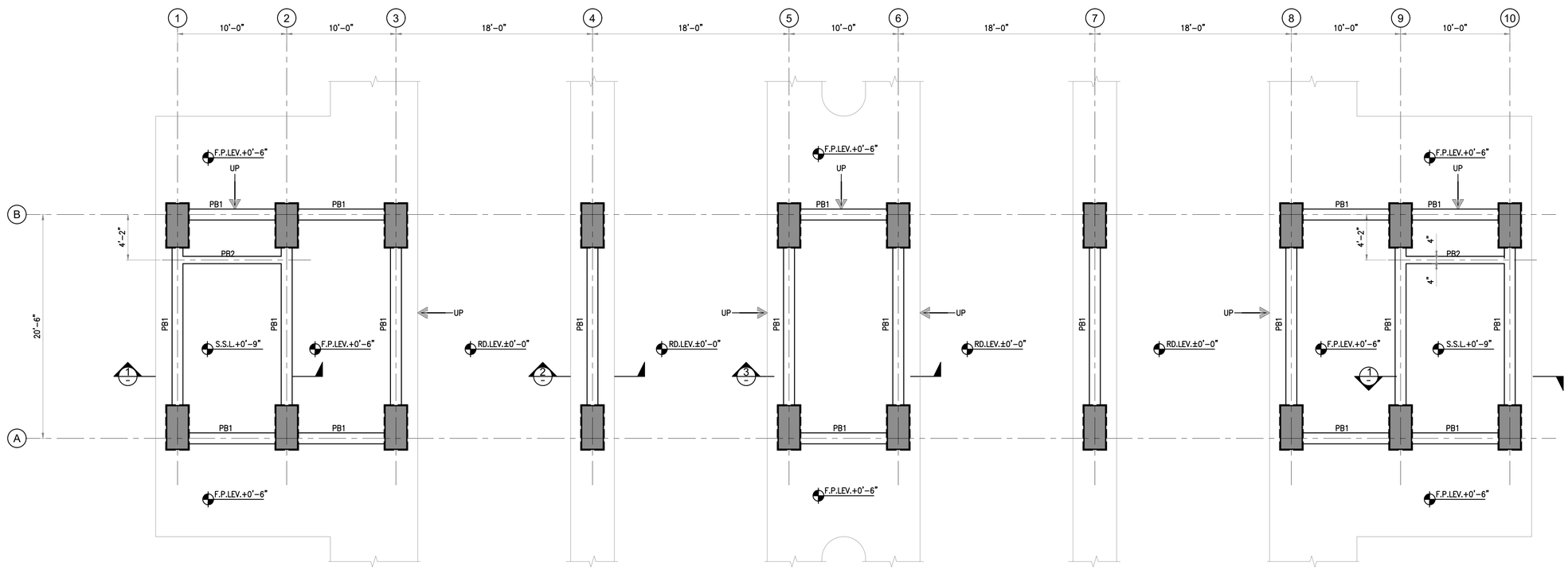
SECTION 3/– SCALE 1/2"=1'



B/– TYP. SEC. OF BEAM PB1
SCALE 1/2"=1'
(FOR REINFORCEMENT)



C/– TYP. SEC. OF BEAM PB2
SCALE 1/2"=1'
(FOR REINFORCEMENT)



A/– PLINTH FRAMING PLAN
SCALE 3/16"=1'

Client :

Sindh Madressatul Islam University

Consultant :

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :

Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

Building Name:
GATE HOUSE

Drawing Title :
PLINTH FRAMING PLAN AND SECTION DETAILS

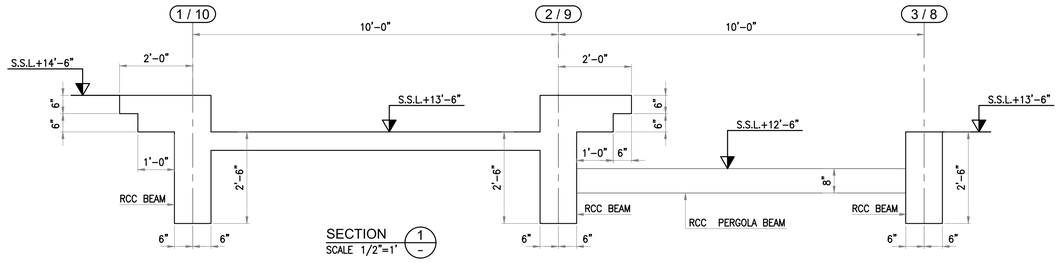
Designed : R.A	Checked : M.I.	Approved : A.K.M
Drawn : M.S	Date : May,2018	Scale / Sheet : AS SHOWN
Project Code : 00986		Rev. : 0

Drawing No. :
EA-00986-SMGO-S-2001

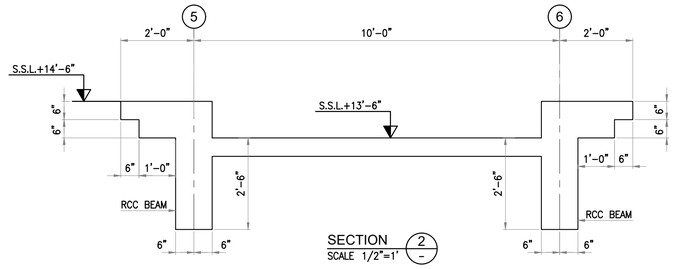
Last Save: Saeed.ahmed Date: Monday, September 2, 2024

NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. FOR SLAB & BEAM REINFORCEMENT EA-00986-SMGO-S-3001..
5. ALL BEAMS ARE 8"X30" U.N.O.
6. FOR COLUMN LAYOUT REFER COLUMN LAYOUT PLAN.
7. ALL CAST-IN-SITU CONCRETE SHALL HAVE MINIMUM 28 DAYS CYLINDRICAL COMPRESSIVE STRENGTH fc' FOR:

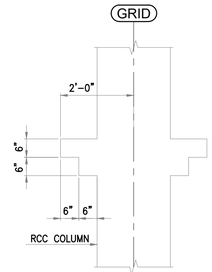
COLUMNS/RCC WALLS/WATER RETAINING STRUCTURES	=	3000 PSI
FOUNDATIONS	=	3000 PSI
BEAMS/SLABS/STAIRS	=	3000 PSI



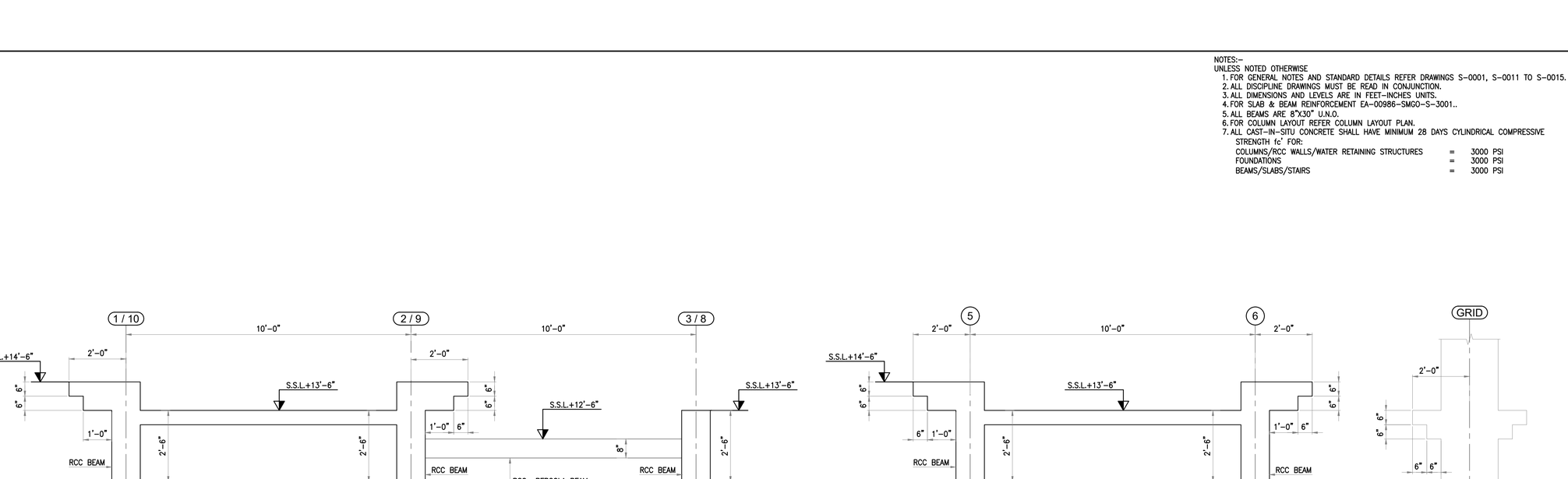
SECTION 1 / SCALE 1/2"=1'



SECTION 2 / SCALE 1/2"=1'



SECTION 3 / SCALE 1/2"=1'



ROOF FRAMING PLAN / SCALE 3/16"=1'

Client :

Sindh Madressatul Islam University

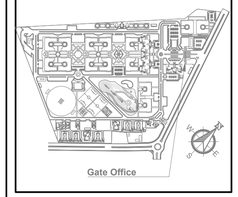
Consultant :

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status: CONSTRUCTION

Building Name: GATE HOUSE

Drawing Title : ROOF FRAMING PLAN AND SECTION DETAILS

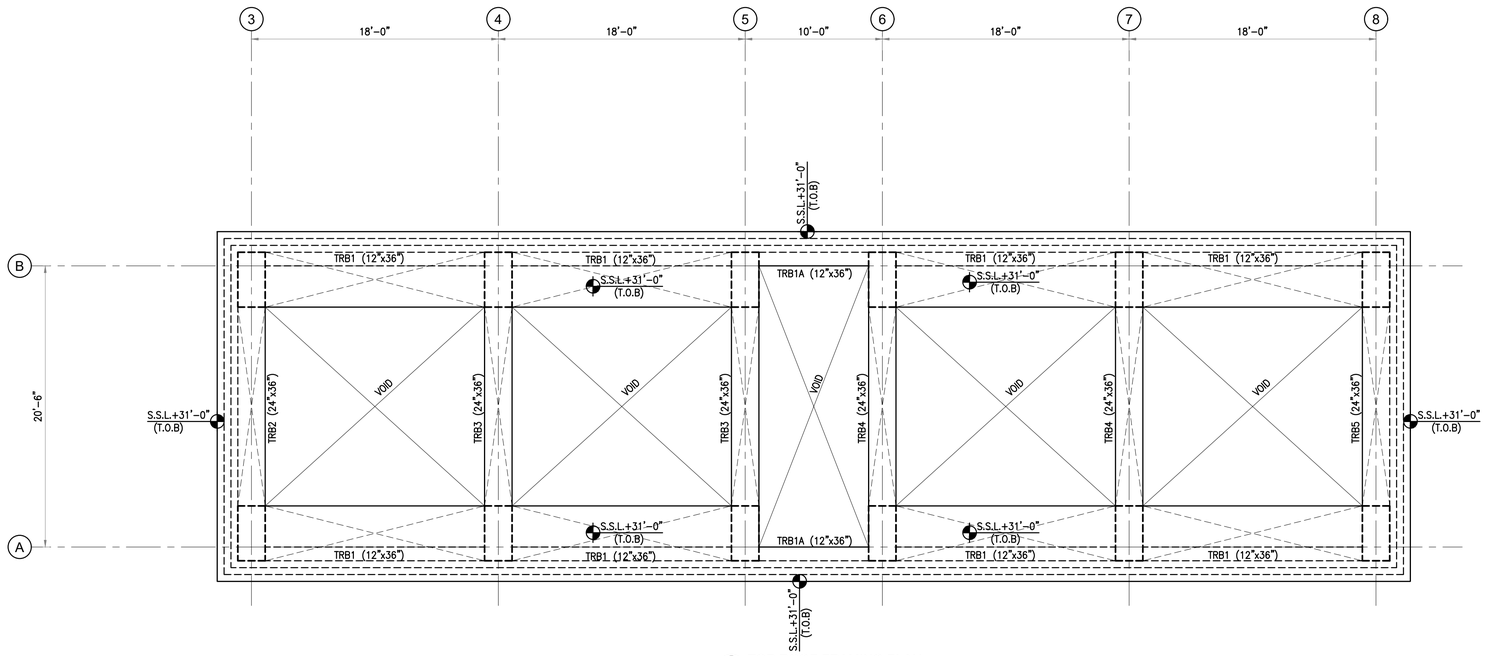
Designed : R.A	Checked : M.L	Approved : A.K.M
Drawn : M.S	Date : May,2018	Scale / Sheet : AS SHOWN
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO-S-2002

Last Save: Saeed.ahmed Date: Monday, September 2, 2024

NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. FOR BEAM ELEVATION DIMENSIONAL EA-00986-SMGO-S-2004 & S-2005.
5. FOR BEAM ELEVATION REINFORCEMENT EA-00986-SMGO-S-4001 & S-4002.
6. ALL CAST-IN-SITU CONCRETE SHALL HAVE MINIMUM 28 DAYS CYLINDRICAL COMPRESSIVE STRENGTH fc' FOR:

COLUMNS/RCC WALLS/WATER RETAINING STRUCTURES	=	3000 PSI
FOUNDATIONS	=	3000 PSI
BEAMS/SLABS/STAIRS	=	3000 PSI



A TOP ROOF FRAMING PLAN
SCALE 1/8"=1'

Client :

Sindh Madressatul Islam University

Consultant :

EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :

Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status: CONSTRUCTION

Building Name: GATE HOUSE

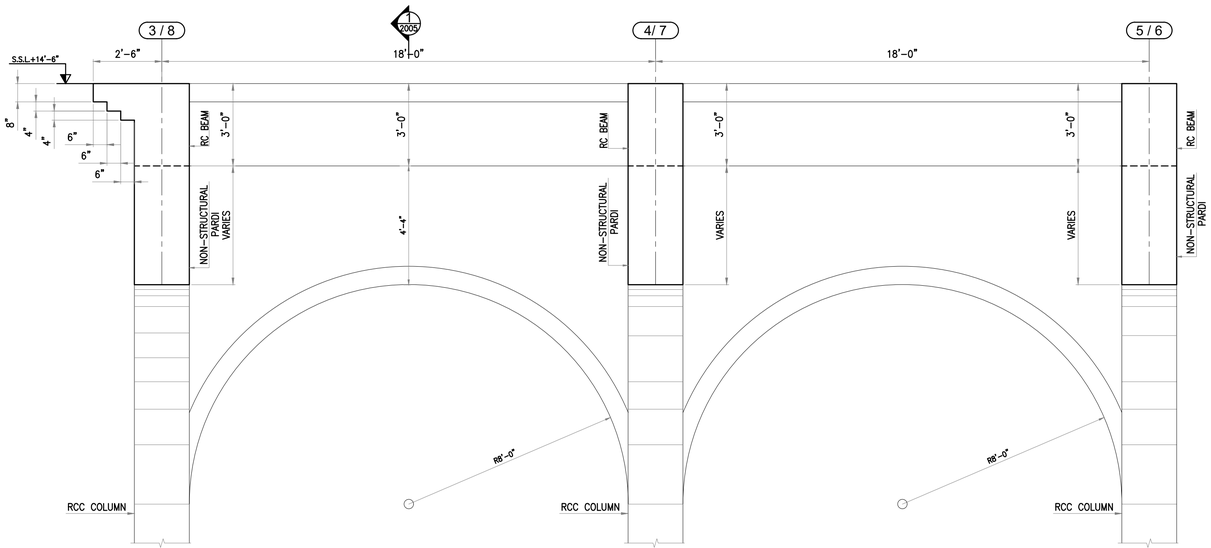
Drawing Title : TOP ROOF FRAMING PLAN

Designed : R.A	Checked : M.I.	Approved : A.K.M
Drawn : S.D	Date : May,2018	Scale / Sheet : AS SHOWN
Project Code : 00986		Rev. : 0

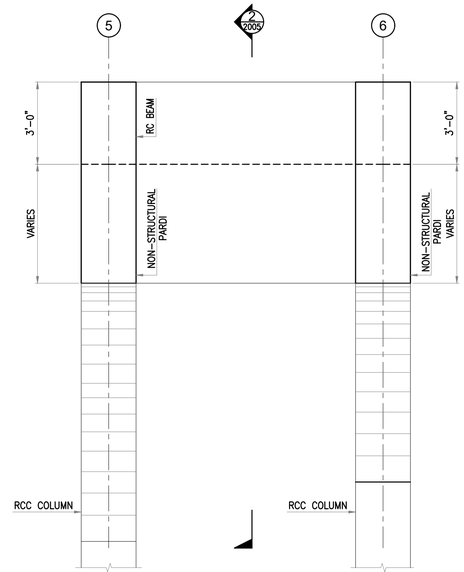
Drawing No. : EA-00986-SMGO-S-2003

Last Save: Saeed.ahmed Date: Monday, September 2, 2024

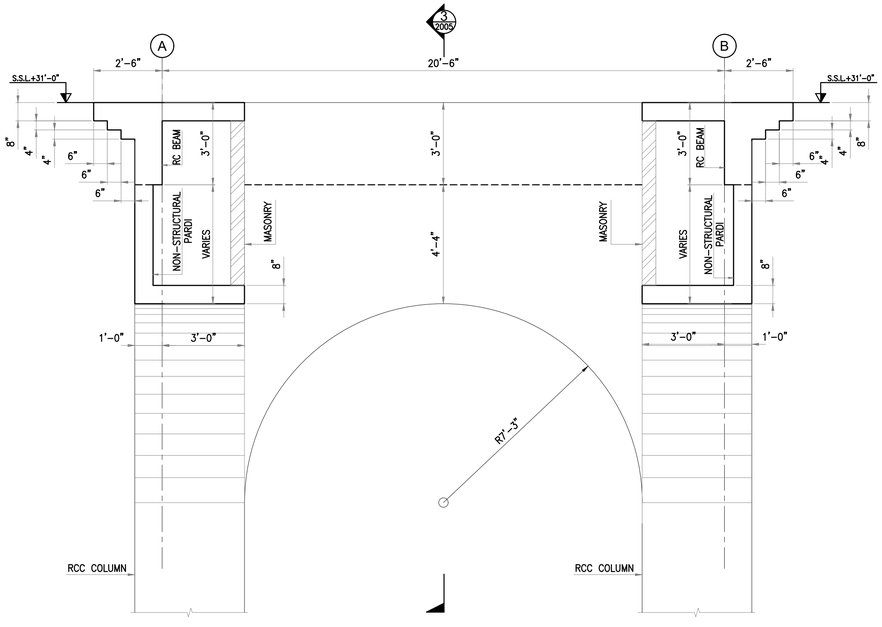
NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. FOR BEAM MARK DETAILS REFER DWG. NO. EA-00986-SMGO-S-2003.



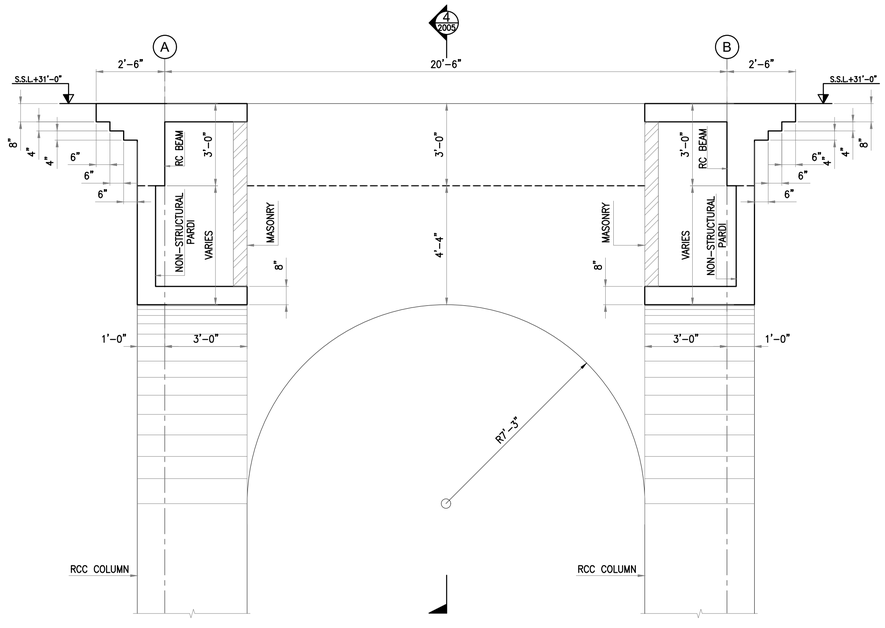
A TYP. ELEV. OF BEAM TRB1 AT GRID (B)
SCALE 3/8"=1'



B TYP. ELEV. OF BEAM TRB1A (B)
SCALE 3/8"=1'



C TYP. ELEV. OF BEAM TRB2 AT GRID (3)
SCALE 3/8"=1'

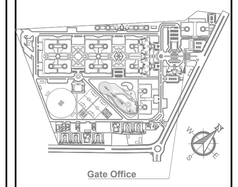


D TYP. ELEV. OF BEAM TRB3 AT GRID (4 & 5)
SCALE 3/8"=1'

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

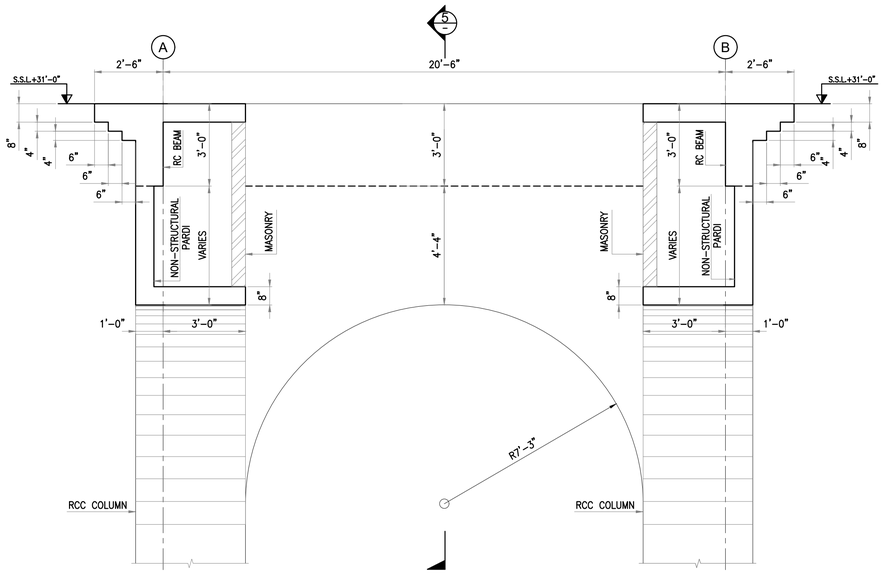
Building Name:
GATE HOUSE

Drawing Title :
TOP ROOF BEAM ELEVATION DIMENSIONAL DETAILS (SHEET 1 OF 2)

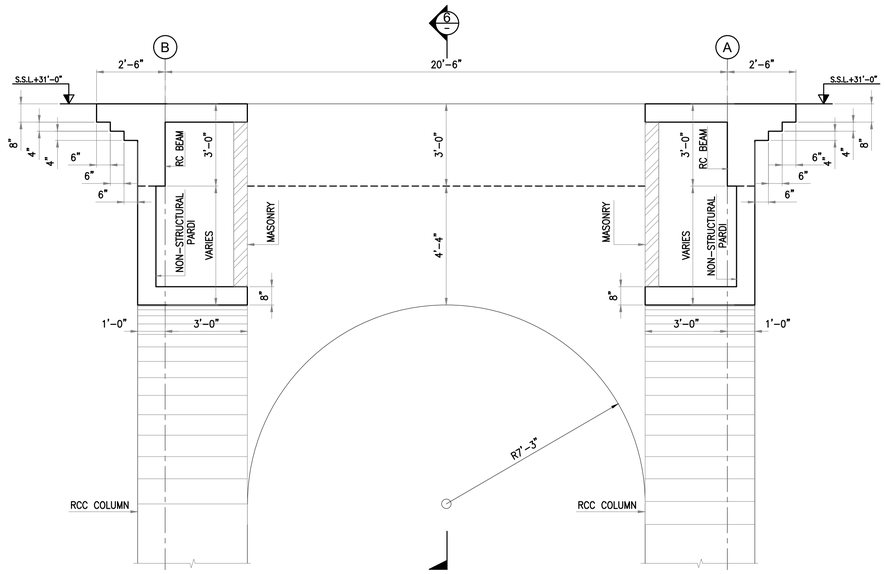
Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO-S-2004

Last Save: Saeed ahmed Date: Monday, September 2, 2024

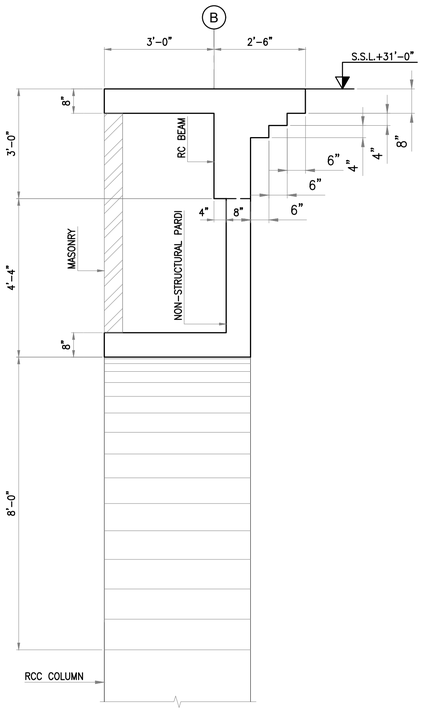


E TYP. ELEV. OF BEAM TRB4 AT GRID (6 &7)
SCALE 3/8"=1'

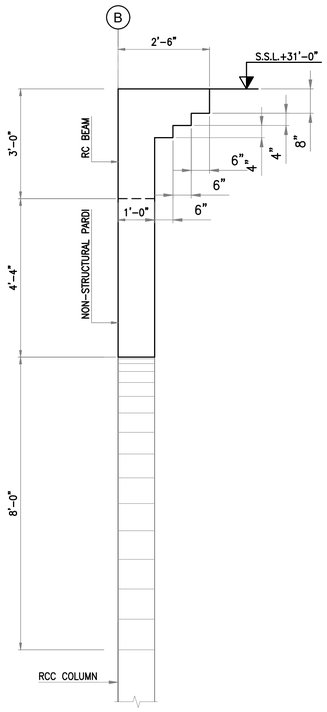


F TYP. ELEV. OF BEAM TRB5 AT GRID (8)
SCALE 3/8"=1'

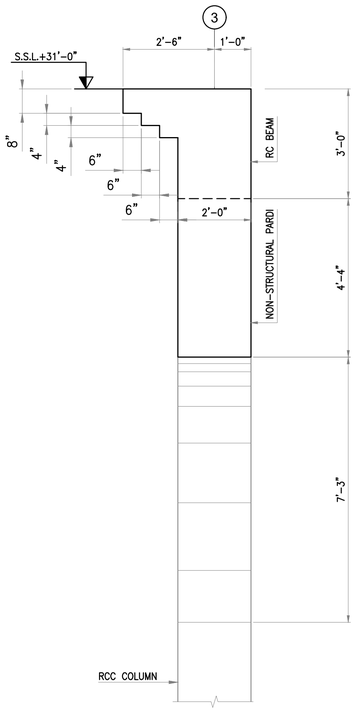
NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. FOR BEAM MARK DETAILS REFER DWG. NO. EA-00986-SMGO-S-2003.



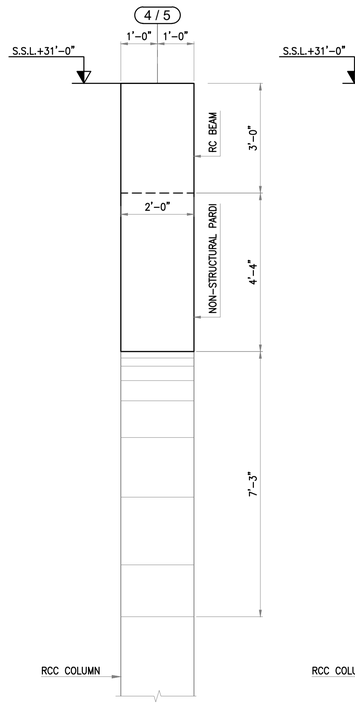
SECTION 1 / 2004
SCALE 1/2"=1'



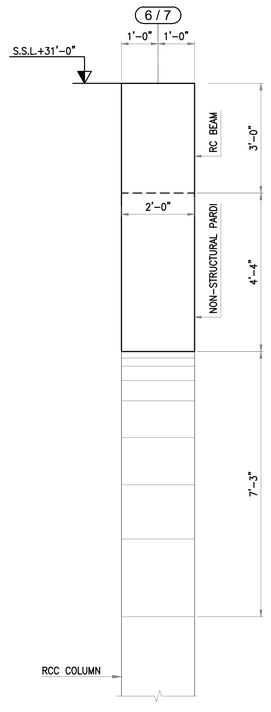
SECTION 2 / 2004
SCALE 1/2"=1'



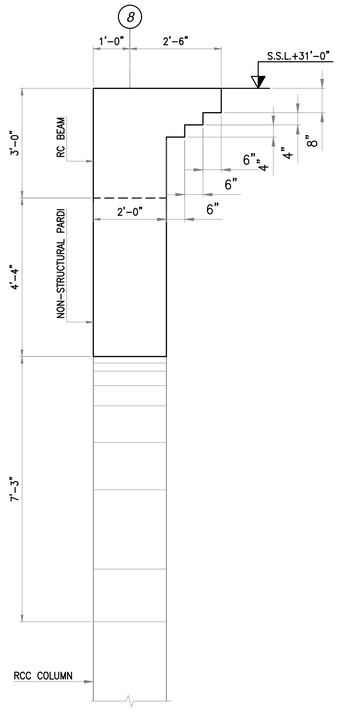
SECTION 3 / 2004
SCALE 1/2"=1'



SECTION 4 / 2004
SCALE 1/2"=1'



SECTION 5 / -
SCALE 1/2"=1'

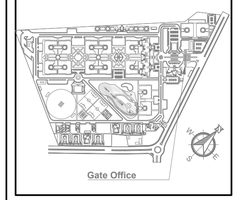


SECTION 6 / -
SCALE 1/2"=1'

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION
REVISIONS		

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

Building Name:
GATE HOUSE

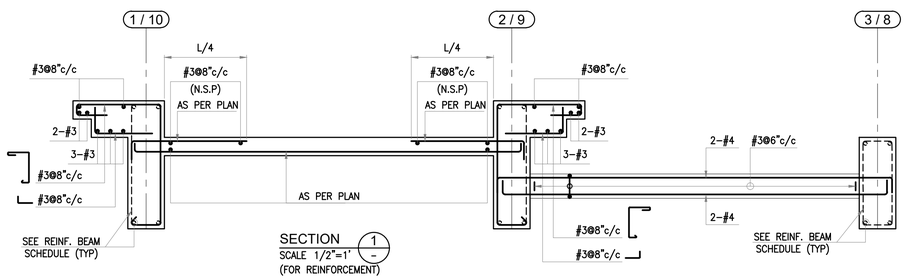
Drawing Title :
TOP ROOF BEAM ELEVATION DIMENSIONAL DETAILS (SHEET 2 OF 2)

Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

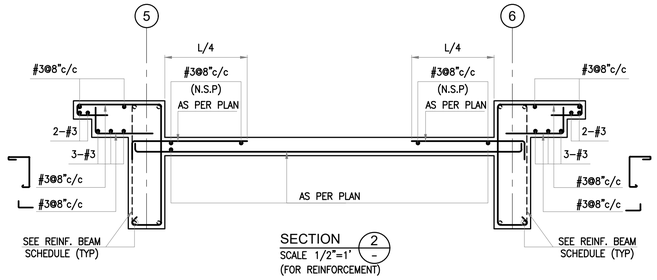
Drawing No. :
EA-00986-SMGO-S-2005

Last Save: Saeed.ahmed Date: Monday, September 2, 2024

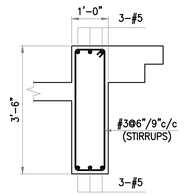
NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. ALL CAST-IN-SITU CONCRETE SHALL HAVE MINIMUM 28 DAYS CYLINDRICAL COMPRESSIVE STRENGTH fc' FOR:
   COLUMNS/RCC WALLS/WATER RETAINING STRUCTURES = 3125 PSI
   FOUNDATIONS = 2500 PSI
   BEAMS/SLABS/STAIRS = 2500 PSI



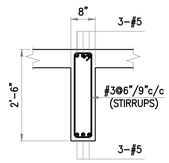
SECTION 1 / - SCALE 1/2"=1' (FOR REINFORCEMENT)



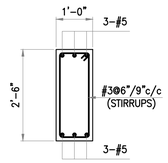
SECTION 2 / - SCALE 1/2"=1' (FOR REINFORCEMENT)



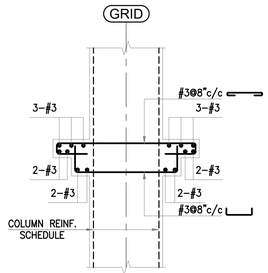
B / - TYP. SEC. OF ROOF BEAM RB1 SCALE 1/2"=1'



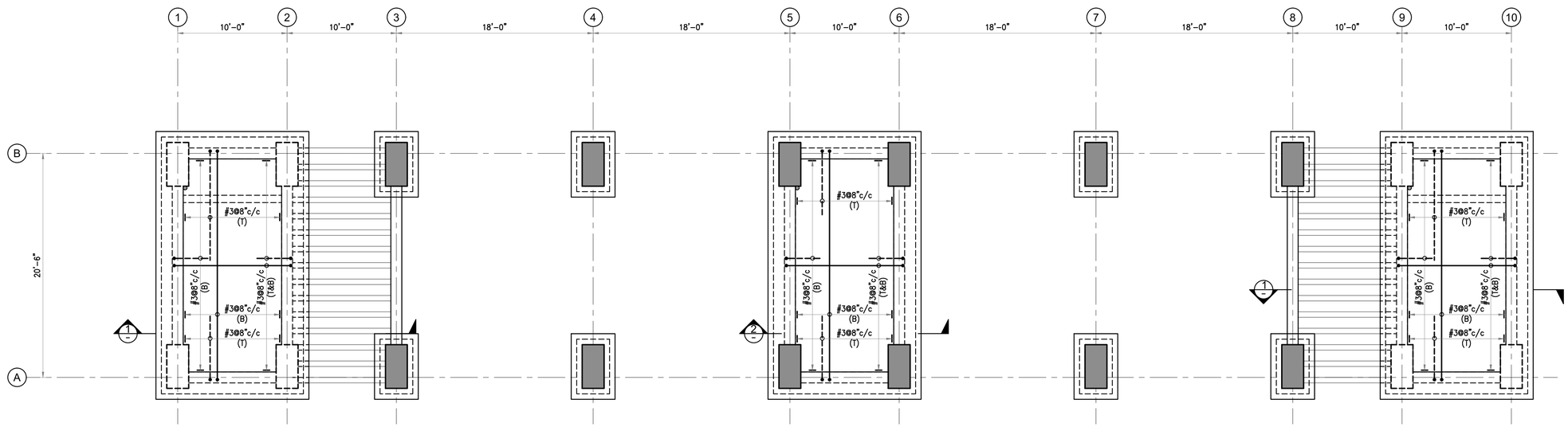
C / - TYP. SEC. OF ROOF BEAM RB2 SCALE 1/2"=1'



D / - TYP. SEC. OF ROOF BEAM RB3 SCALE 1/2"=1' #3@8"c/c



SECTION 3 / - SCALE 1/2"=1'

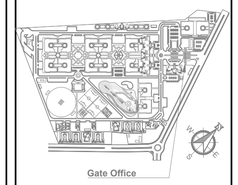


A / - ROOF REINFORCEMENT PLAN SCALE 3/16"=1'

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION
REVISIONS		

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

Building Name:
GATE HOUSE

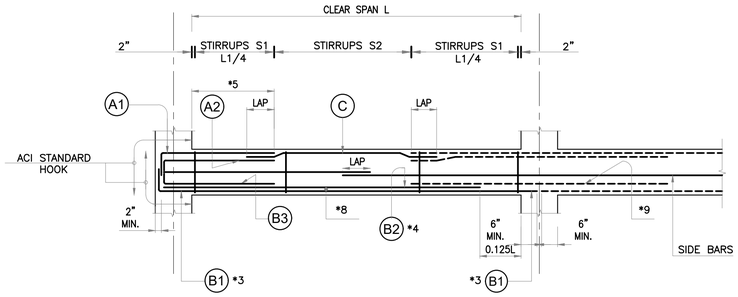
Drawing Title :
ROOF SLAB / BEAM REINFORCEMENT AND SECTION DETAILS

Designed :	Checked :	Approved :
R.A	M.L	A.K.M
Drawn :	Date :	Scale / Sheet :
M.S	May.2018	AS SHOWN
Project Code :		Rev. :
00986		0

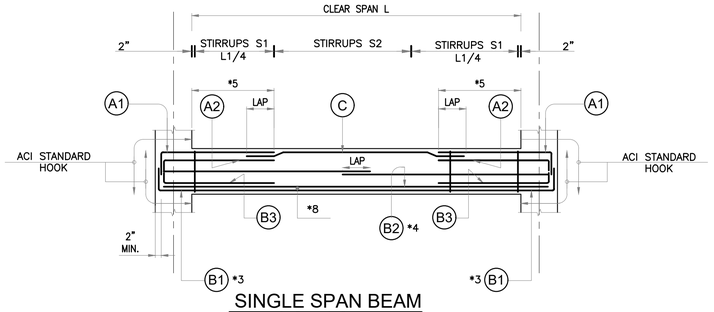
Drawing No. :
EA-00986-SMGO-S-3001

Last Save: Saeed.ahmed Date: Monday, September 2, 2024

BEAM TYPE-1

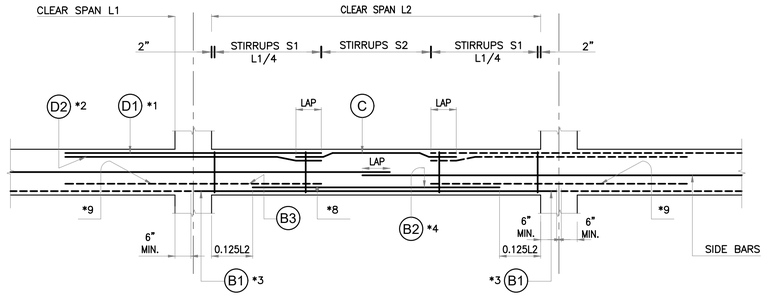


FIRST SPAN OF CONTINUOUS BEAM
SCALE = 1'-0" = 3/16"

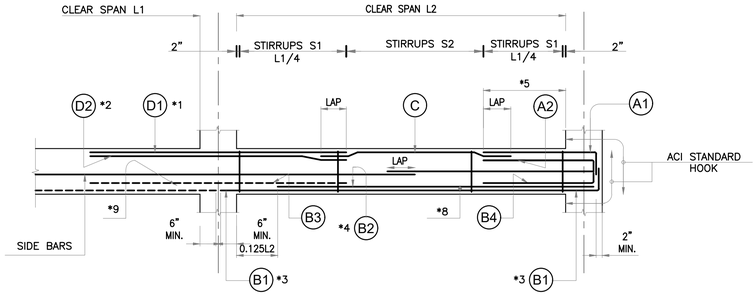


SINGLE SPAN BEAM
SCALE = 1'-0" = 3/16"

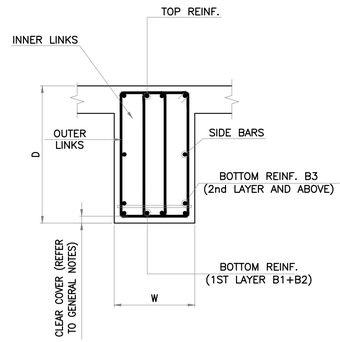
BEAM TYPE-2



INTERMEDIATE SPAN OF CONTINUOUS BEAM
SCALE = 1'-0" = 3/16"



END SPAN OF CONTINUOUS BEAM
SCALE = 1'-0" = 3/16"



TYPICAL BEAM SECTION
SCALE = 1'-0" = 3/4"

SIDE REINFORCEMENT (U.N.O)

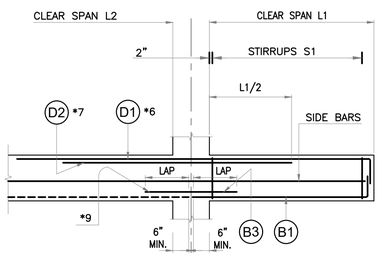
FOR BEAMS DEEPER THAN 3'-0" (OVERALL) AND FOR EXTERNAL FACES ONLY OF ALL OTHER BEAMS PROVIDE SIDE REINFORCEMENT AS FOLLOWS:

WIDTH OF BEAM	SIDE REINF.
8"	#4@10"
9"/10"	#4@9"
12"	#4@8"
≥16"	#4@6"

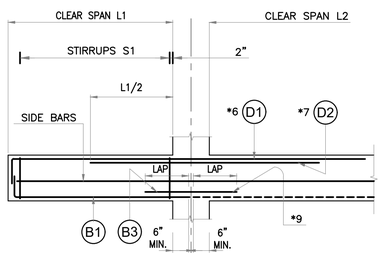
NOTES:

1- FOR DETAILS OF BARS SEE BEAM SCHEDULE.
2- MAXIMUM CLEAR DISTANCE BETWEEN LONGITUDINAL BARS = 7".

BEAM TYPE-3

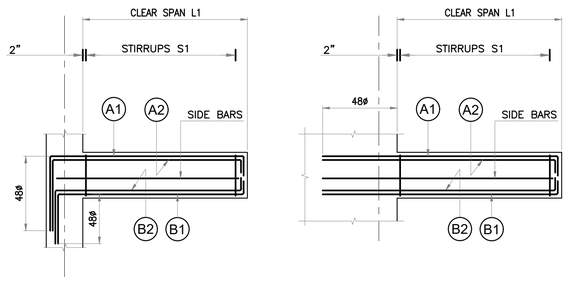


CANTILEVER AT END SPAN
SCALE = 1'-0" = 3/16"



CANTILEVER AT FIRST SPAN
SCALE = 1'-0" = 3/16"

BEAM TYPE-4



BRACKET DETAIL
SCALE = 1'-0" = 3/16"

NOTES:

- FOR DETAILS OF BARS SEE BEAM SCHEDULE.
- MAXIMUM CLEAR DISTANCE BETWEEN

*1 D1 SHALL EXTEND INTO SPAN L1 AND L2 BY A DISTANCE OF 1/3.L WHERE L IS GREATER OF L1 AND L2 BUT NOT LESS THAN Ld. IF SPAN L1 IS A CANTILEVER. THEN D1 SHALL BE PROVIDED AND DETAILED AS PER THE CANTILEVER SPAN.

D1 ON PERIMETER BEAMS ,AT LEAST ⅛ OF TOTAL TOP REINFORCEMENT OF BOTH SUPPORTS SHALL BE CONTINUOUS OR CLASS A SPLICED AT MID SPAN.

*2 D2 SHALL EXTEND INTO EACH OF THE ADJACENT SPANS BY A DISTANCE OF ONE QUARTER OF EACH RESPECTIVE SPAN FROM THE FACE OF THE SUPPORT BUT NOT LESS THAN Ld. IF SPAN L1 IS A CANTILEVER THEN D2 SHALL BE PROVIDED AND DETAILED AS PER THE CANTILEVER SPAN.

*3 B1 SHALL NOT BE LESS THAN ONE THIRD OF TOTAL POSITIVE REINF. & TO BE EXTENDED INTO EACH OF THE ADJACENT SUPPORT BY MIN. OF 6".

*4 B2 CAN BE PLACED IN 1 LAYER OR MORE LAYERS SPACERS ARE ONLY NECESSARY FOR TWO OR MORE LAYERS, TOTAL LENGTH SHALL NOT BE LESS THAN 2 X Ld.

*5 0.25L + ANCHORAGE LENGTH (BUT NOT LESS THAN Ld. FROM THE FACE OF SUPPORT).

*6 D1 SHALL EXTEND INTO SPAN L2 BY A DISTANCE OF 1/3 L1 OR 1/3 L2, WHICHEVER IS GREATER FROM THE FACE OF THE SUPPORT BUT NOT LESS THAN Ld.

*7 D2 SHALL EXTEND INTO SPAN L2 BY A DISTANCE OF 1/4 L1 OR 1/4 L2. WHICHEVER IS GREATER FROM THE FACE OF THE SUPPORT BUT NOT LESS THAN Ld.

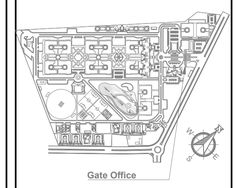
*8 SPACERS FOR 2 LAYERS MIN. 1"db OR MAIN BARø WHICHEVER IS GREATER, WHERE SPACERS ARE NECESSARY.

*9 FOR PERIMETER BEAMS AT LEAST 1/4 OF TOTAL BOTTOM REINFORCEMENT OF BOTH SUPPORTS SHALL BE CONTINUOUS OR CLASS A SPLICED.

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

Building Name:
GATE HOUSE

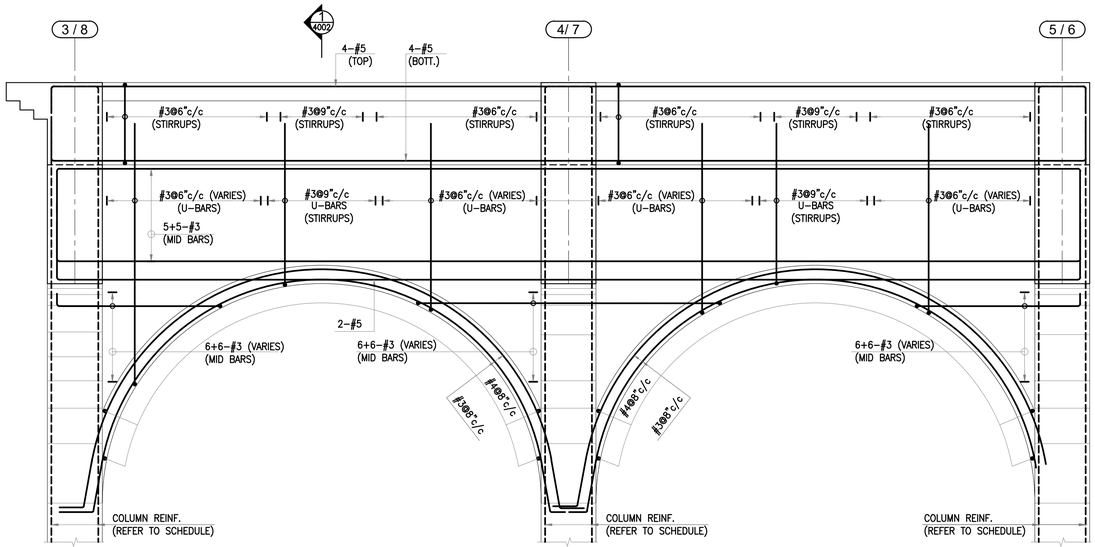
Drawing Title :
BEAM STANDARD DETAILS

Designed :	Checked :	Approved :
R.A	M.I	A.K.M
Drawn :	Date :	Scale / Sheet :
S.D	May,2018	AS SHOWN
Project Code : 00986		Rev. : 0

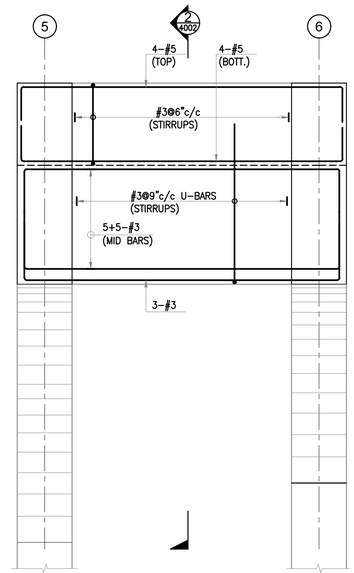
Drawing No. : EA-00986-SMGO-S-4000

Last Save: Saeed.ahmed Date: Monday, August 26, 2024

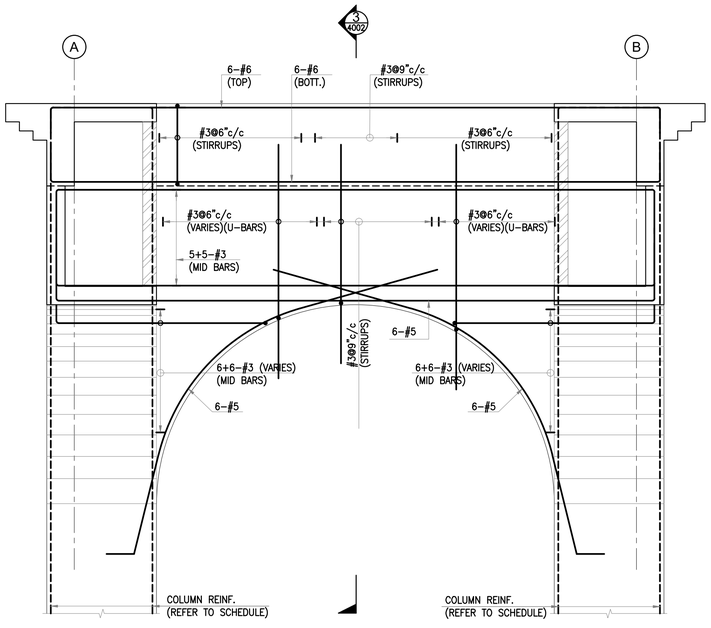
NOTES:-
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S-0001, S-0011 TO S-0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET-INCHES UNITS.
4. FOR BEAM MARK DETAILS REFER DWG. NO. EA-00986-SMGO-S-2003.



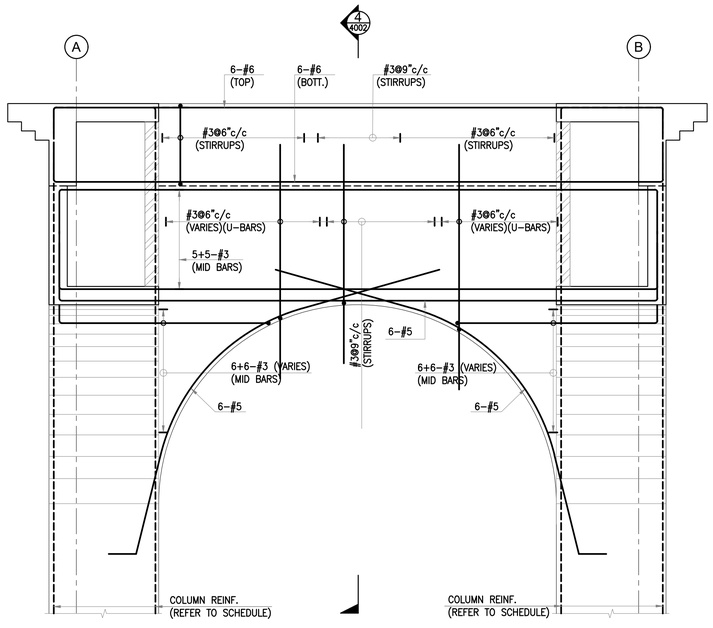
A TYP. ELEV. OF BEAM TRB1 AT GRID (B)
SCALE 3/8"=1' (12"x36")



B TYP. ELEV. OF BEAM TRB1A (B)
SCALE 3/8"=1' (12"x36")



C TYP. ELEV. OF BEAM TRB2 AT GRID (3)
SCALE 3/8"=1' (24"x36")

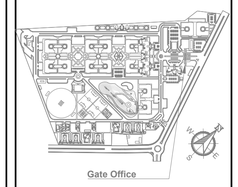


D TYP. ELEV. OF BEAM TRB3 AT GRID (4 & 5)
SCALE 3/8"=1' (24"x36")

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

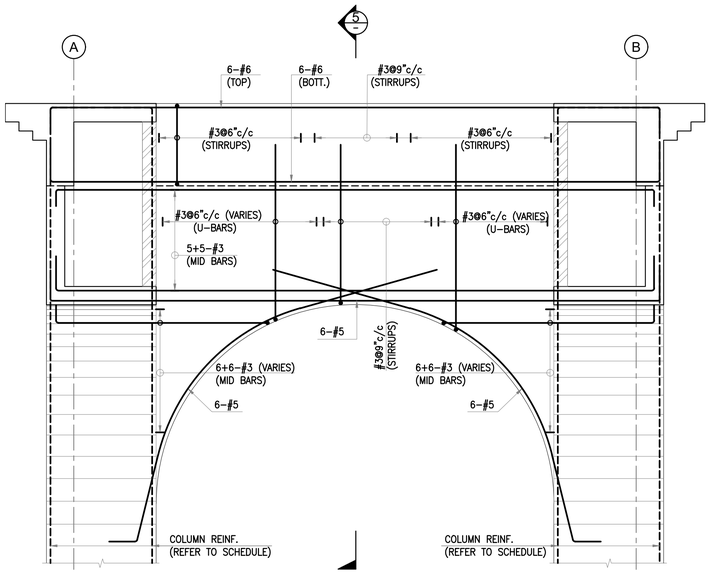
Status: CONSTRUCTION

Building Name: GATE HOUSE

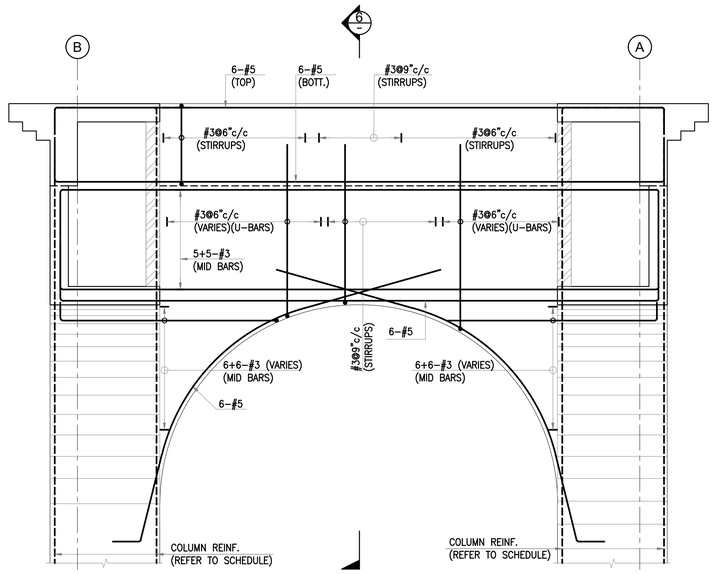
Drawing Title : TOP ROOF BEAM ELEVATION REINF. AND DETAILS (SHEET 1 OF 2)

Designed :	Checked :	Approved :
R.A	M.I.	A.K.M
Drawn :	Date :	Scale / Sheet :
M.S	May,2018	AS SHOWN
Project Code : 00986		Rev. : 0
Drawing No. : EA-00986-SMGO-S-4001		

Last Save: Saeed.ahmed Date: Monday, September 2, 2024

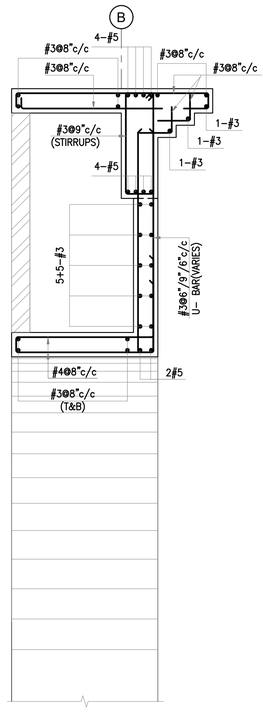


E — TYP. ELEV. OF BEAM TRB4 AT GRID (6 &7)
SCALE 3/8"=1' (24"x36")

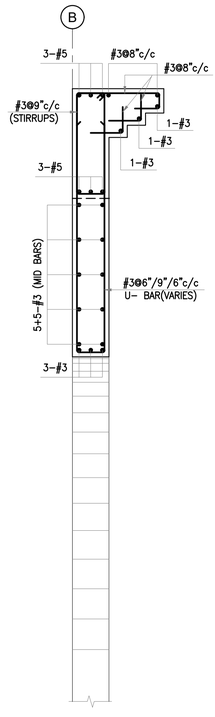


F — TYP. ELEV. OF BEAM TRB5 AT GRID (8)
SCALE 3/8"=1' (24"x36")

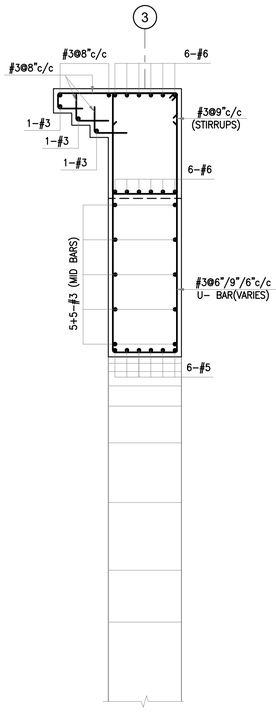
NOTES:–
UNLESS NOTED OTHERWISE
1. FOR GENERAL NOTES AND STANDARD DETAILS REFER DRAWINGS S–0001, S–0011 TO S–0015.
2. ALL DISCIPLINE DRAWINGS MUST BE READ IN CONJUNCTION.
3. ALL DIMENSIONS AND LEVELS ARE IN FEET–INCHES UNITS.
4. FOR BEAM MARK DETAILS REFER DWG. NO. EA–00986–SMGO–S–2003.



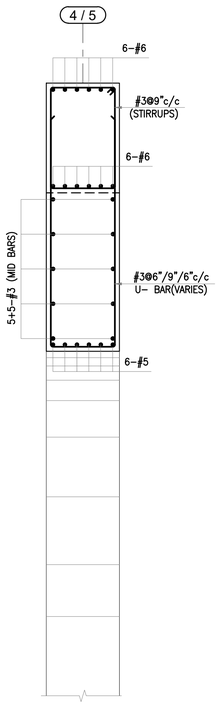
SECTION 1 (4001)
SCALE 1/2"=1'



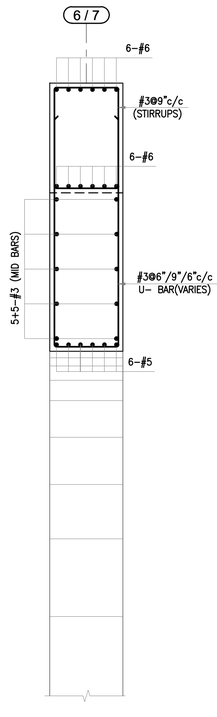
SECTION 2 (4001)
SCALE 1/2"=1'



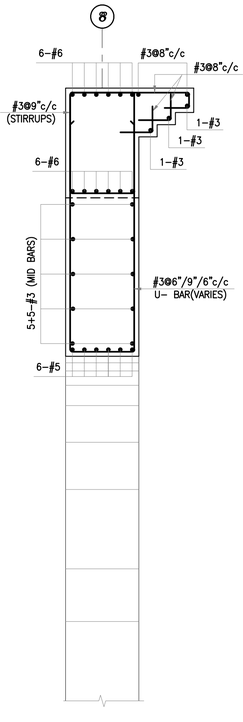
SECTION 3 (4001)
SCALE 1/2"=1'



SECTION 4 (4001)
SCALE 1/2"=1'



SECTION 5 (–)
SCALE 1/2"=1'

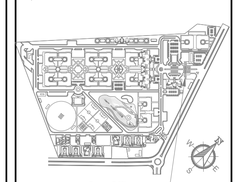


SECTION 6 (–)
SCALE 1/2"=1'

Client :
Sindh Madressatul Islam University

Consultant :
EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :


Note:

Rev. No.	DATE	DESCRIPTION
0	AUG,2024	ISSUED FOR CONSTRUCTION

REVISIONS

Date of Issue	August 2024
Issued To	Client
Issued For	Construction

STRUCTURE

Status:
CONSTRUCTION

Building Name:
GATE HOUSE

Drawing Title :
TOP ROOF BEAM ELEVATION REINF. AND SECTION DETAILS (SHEET 2 OF 2)

Designed :	Checked :	Approved :
R.A	M.L	A.K.M
Drawn :	Date :	Scale / Sheet :
M.S	May,2018	AS SHOWN
Project Code :		Rev. :
00986		0

Drawing No. : EA-00986-SMGO-S-4002

Last Save: Saeed.ahmed Date: Monday, September 2, 2024

S M I U

DEVELOPMENT OF SINDH MADRESSATUL ISLAM UNIVERSITY (SMIU) CAMPUS AT EDUCATION CITY MALIR KARACHI, PAKISTAN

Gate Office

ARCHITECTURE
Volume - IV Tender

September 2024

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7,
Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

ARCHITECTURE

S.#	DRAWING NO.	DRAWING TITLE
A0 - GENERAL DRAWINGS		
01	EA-00986-SMGO-A0-0000	TITLE SHEET
02	EA-00986-SMGO-A0-0001	LIST OF DRAWINGS
03	EA-00986-SMGO-A0-0002	LOCATION PLAN
04	EA-00986-SMGO-A0-0003	SITE PLAN
05	EA-00986-SMGO-A0-0004	S.O.P. (SETTING OUT PLAN)
A1 - ARCHITECTURAL PLANS		
06	EA-00986-SMGO-A1-0100	GROUND FLOOR PLAN
07	EA-00986-SMGO-A1-0200	ROOF PLAN & TOP ROOF PLAN
A2 - SECTIONS		
08	EA-00986-SMGO-A2-0010	SECTIONS A-A, B-B, C-C & D-D
A3 - ELEVATIONS		
09	EA-00986-SMGO-A3-0010	ELEVATIONS 01 & 02
10	EA-00986-SMGO-A3-0020	ELEVATIONS 03 & 04
A5 - ANCILLARY WORKS DETAILS		
11	EA-00986-SMGO-A5-0010	TL-01 (DETAIL OF TOILET)
A6 - SCHEDULES		
12	EA-00986-SMGO-A6-0010	SCHEDULE OF DOORS, WINDOWS & VENTILATOR
13	EA-00986-SMGO-A6-0020	DETAIL OF DOORS, WINDOWS & VENTILATOR (PLANS & ELEVATIONS)
A11 - MISCELANEOUS DETAILS		
14	EA-00986-SMGO-A11-0010	LD - 01 DETAIL OF LOGO

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN
GO FORTH TO SERVE
1885

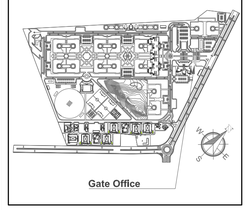
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

Status:
TENDER

Building Name:
GATE OFFICE

Drawing Title :
LIST OF DRAWINGS

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
WA	FEB. 2024	N.T.S. @ A3 N.T.S. @ A1
Project Code : 00986		Rev. : 0

Drawing No. :
EA-00986-SMGO- A0-0001

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

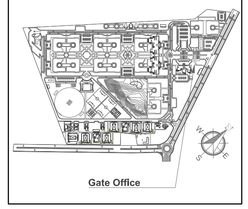
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :

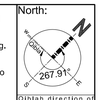


No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:



Qiblah direction of Karachi Sindh,Pakistan is 267.90566° Degrees From North Clockwise

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

Status:

TENDER

Building Name:

GATE OFFICE

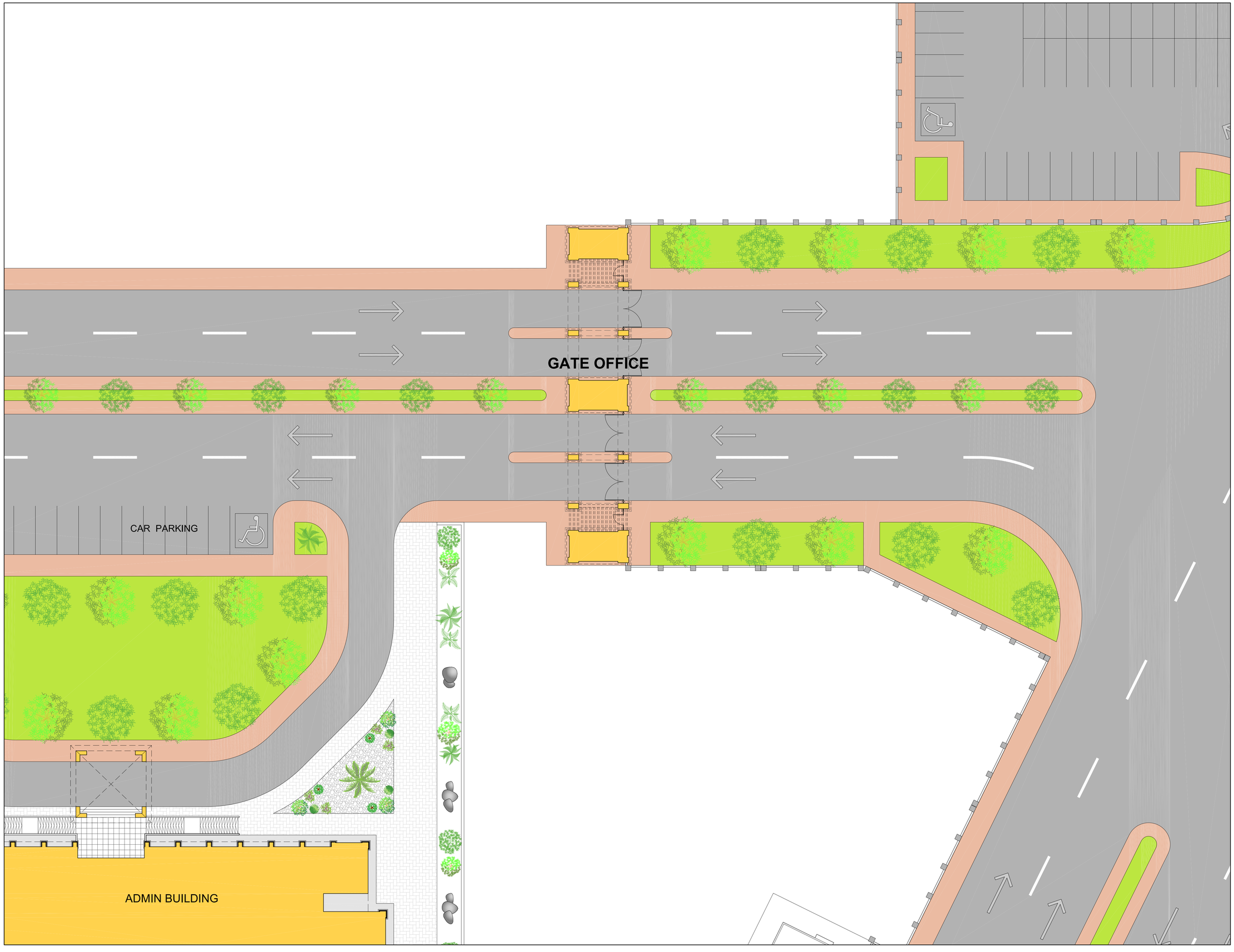
Drawing Title :

LOCATION PLAN

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
WA	FEB, 2024	1/256"=1'-0"@A3 1/128"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. :

EA-00986-SMGO- A0-0002



Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN
GO FORTH TO SERVE
1885

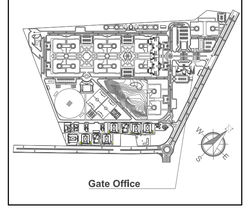
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

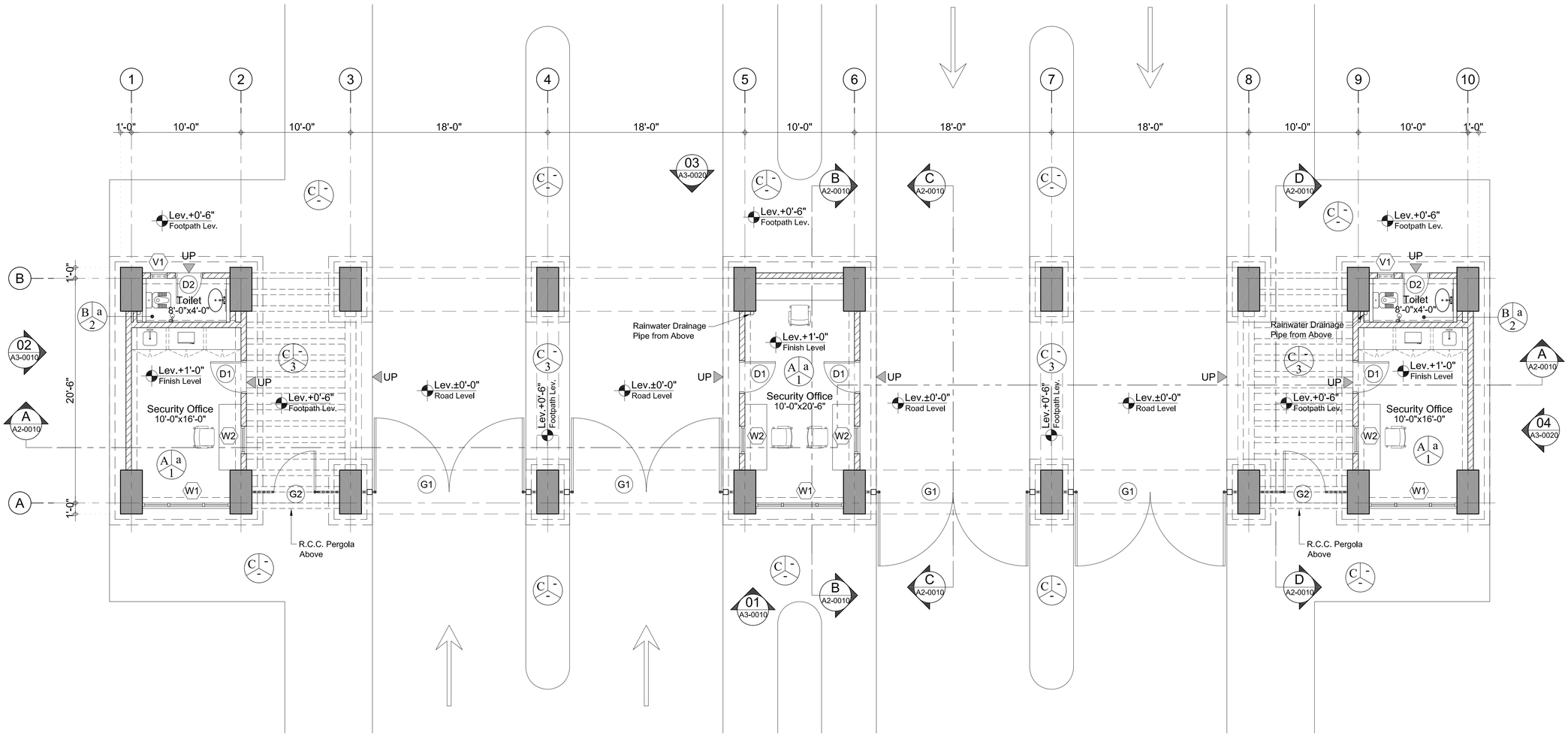
ARCHITECTURE

Status: **TENDER**

Building Name: **GATE OFFICE**

Drawing Title : SITE PLAN

Designed : BRS	Checked : SAM	Approved : PA
Drawn : WA	Date : FEB. 2024	Scale / Sheet : 1/32"=1'-0"@A3 1/16"=1'-0"@A1
Project Code : 00986		Rev. : 0
Drawing No. : EA-00986-SMGO- A0-0003		



FINISHES TAG	FINISHES			GENERAL NOTES		
Ceiling / Flooring / Wall — A a 1	FLOORING A - 16"x16" Vitrified Porcelain Tiles laid in Patterns. B - 12"x12" Matt Ceramic Tiles laid in Patterns. C - 4"x8" Grey Concrete Pavers (Gray 6000 Psi) with Kerbstone.	WALLS 1 - 1/2" thick Plaster on Block Work with Matt Emulsion Paint and 6" High Vitrified Porcelain Tile Skirting. 2 - 12"x12" Glazed Ceramic Tiles up to 5'-0" Height with 1/2" thick Plaster and Matt Enamel Paint above 5'-0" Height. 3 - Color Crete with 1/2" V Grooves.	CEILING a - 1/2" Thick Plaster with 3 Coats of Distemper Paint.	STRUCTURE R.C.C. Framed Structure comprising of Columns, Beams & Slabs as per Structure Engineer Details and Specs. Structure to Comply to Relevant Earthquake Zone. WALLS To be 6" Thick Solid Block Non Load Bearing Wall, as shown in drawing.	WINDOWS • Aluminum Bronze Anodised with 5mm Laminated Clear Glass, as per Design. DOORS • Aluminum Frame Door with 5mm Glass & Aluminum Sheet Infill, as per Design.	ROOF SCREEDING 1:2:4 CC Screed Laid to Slope (2" Thick Minimum).

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

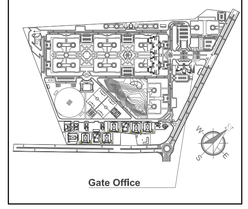
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

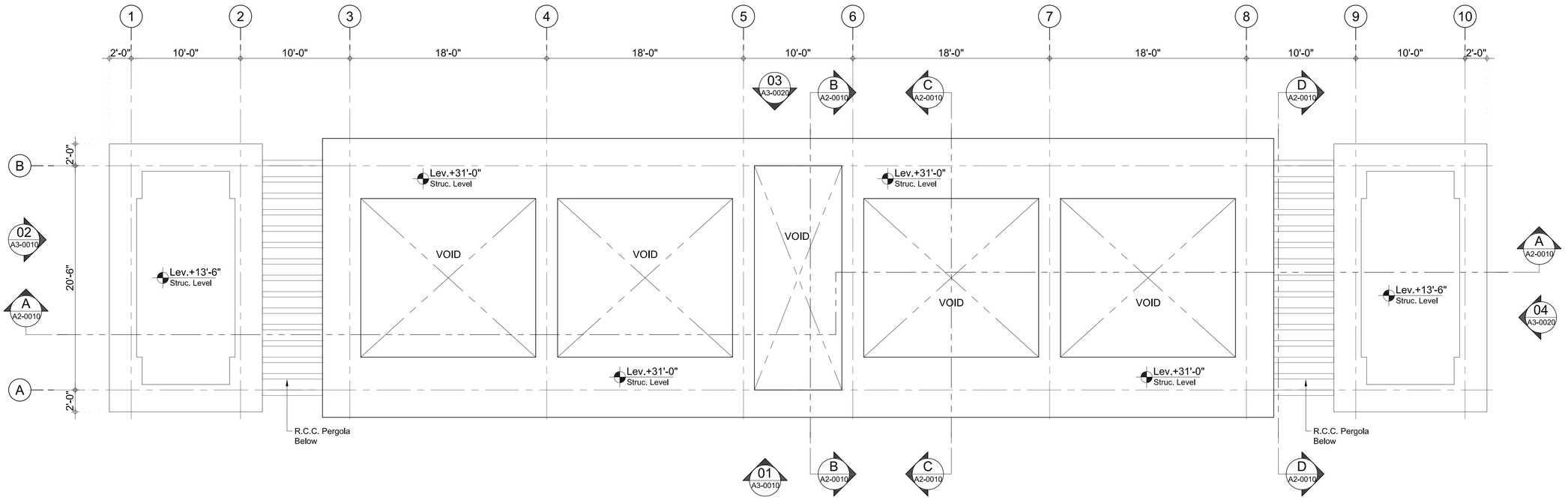
Status:
TENDER

Building Name:
GATE OFFICE

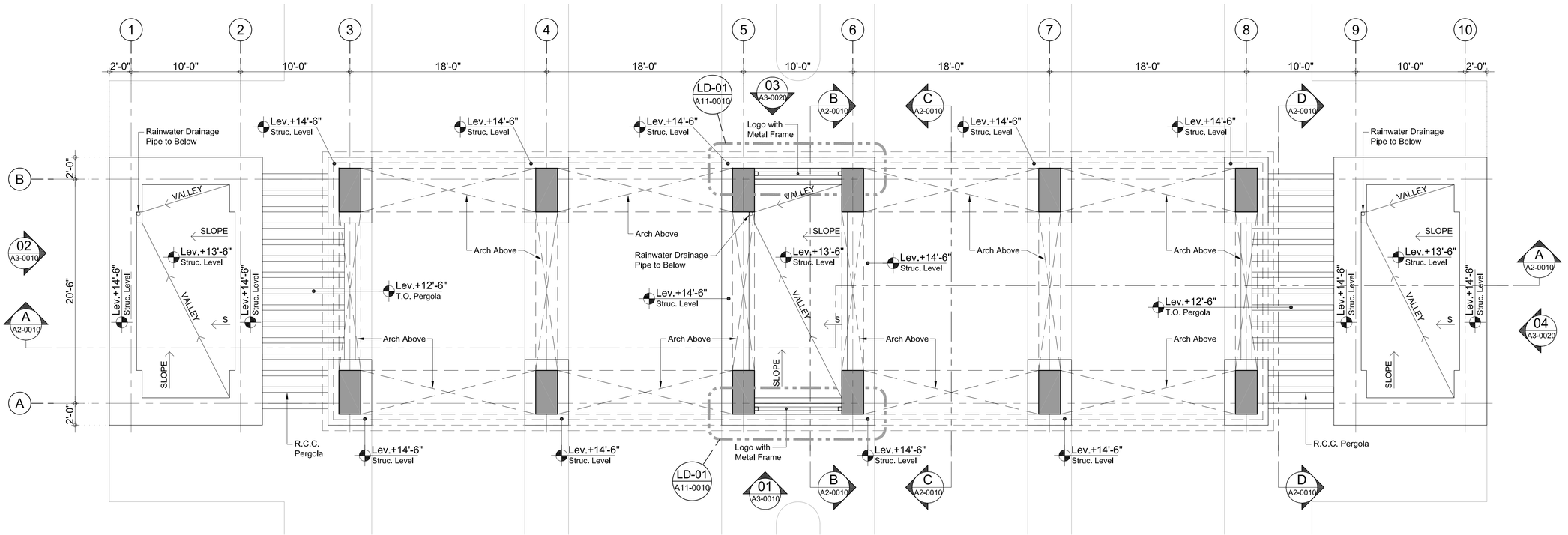
Drawing Title :
GROUND FLOOR PLAN

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
MAB	FEB. 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO- A1-0100



TOP ROOF PLAN



ROOF PLAN

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

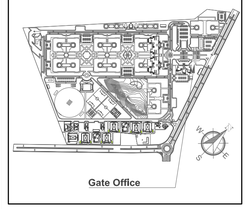
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction of Karachi, Sindh, Pakistan is 267.95065° Degrees From North Clockwise

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

Status: **TENDER**

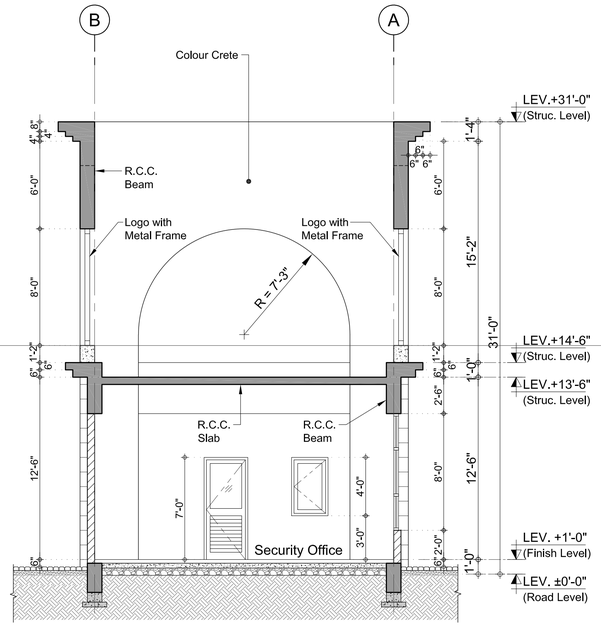
Building Name: **GATE OFFICE**

Drawing Title : ROOF PLAN & TOP ROOF PLAN

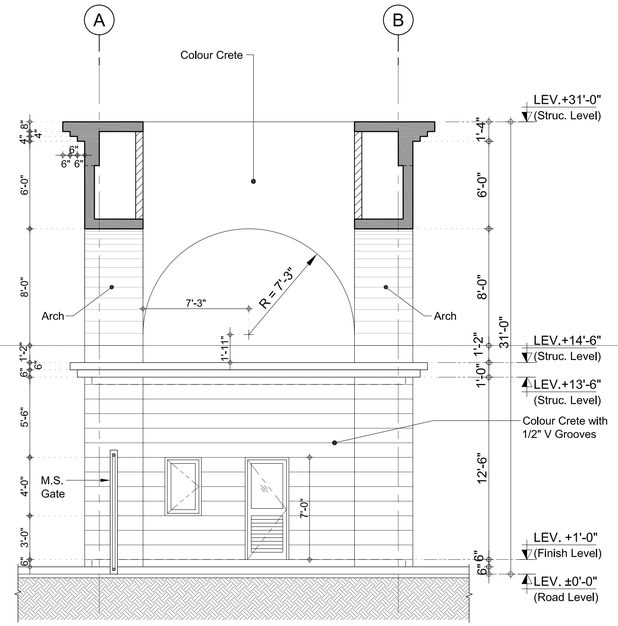
Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
MAB	FEB. 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1

Project Code : 00986 Rev. : 0

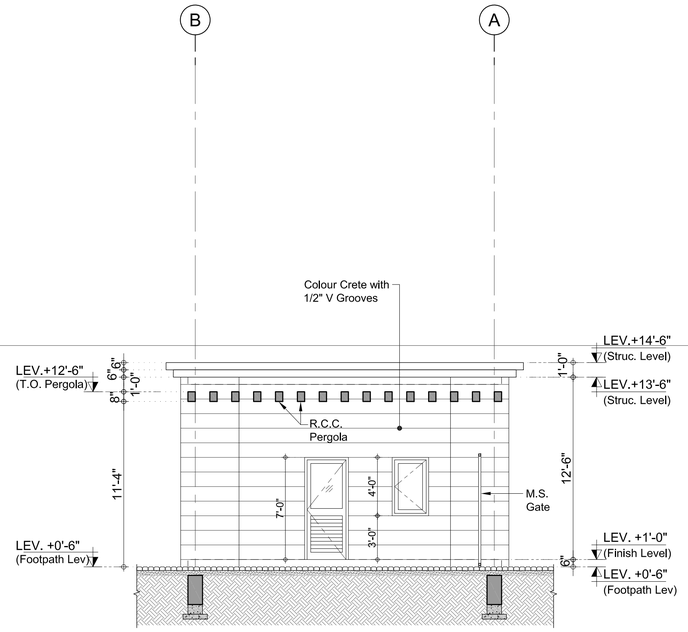
Drawing No. : EA-00986-SMGO- A1-0200



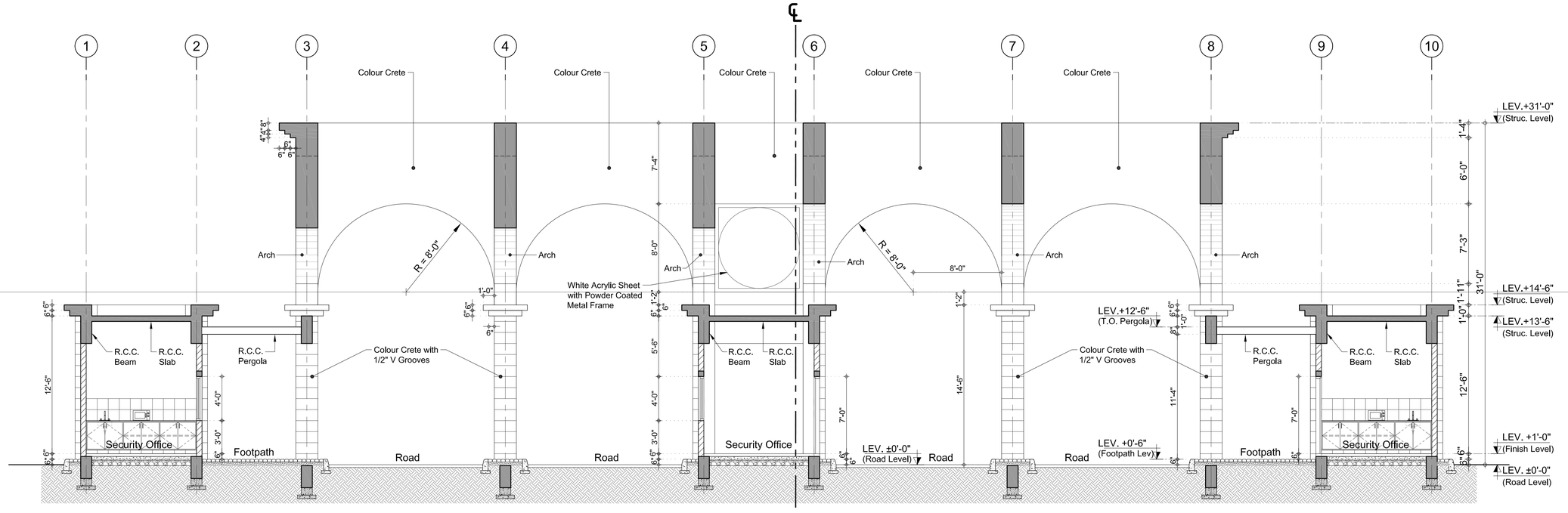
SECTION B-B



SECTION C-C



SECTION D-D



SECTION A-A

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

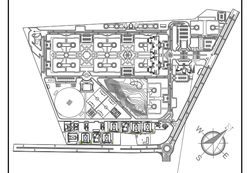
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction of Karachi, Sindh, Pakistan is 267.905065° Degrees From North Clockwise

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

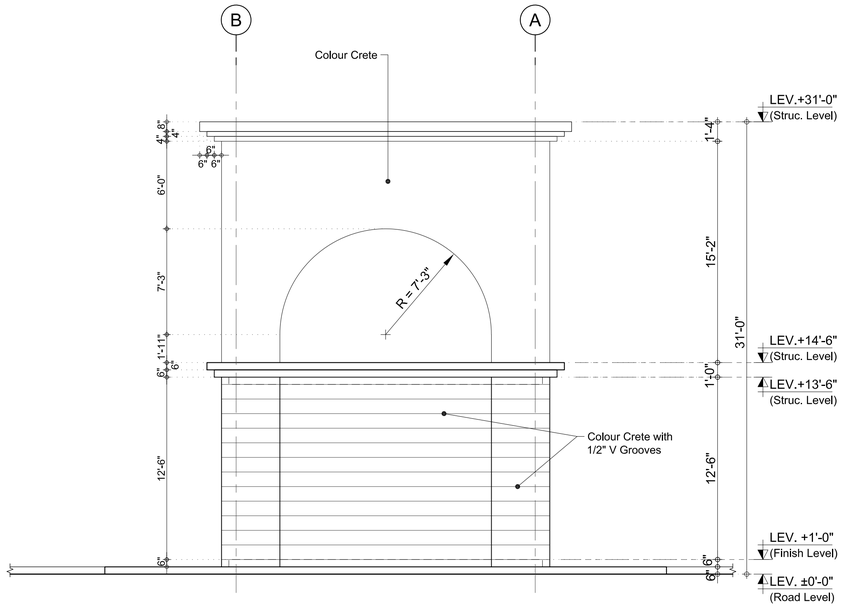
Status: **TENDER**

Building Name: **GATE OFFICE**

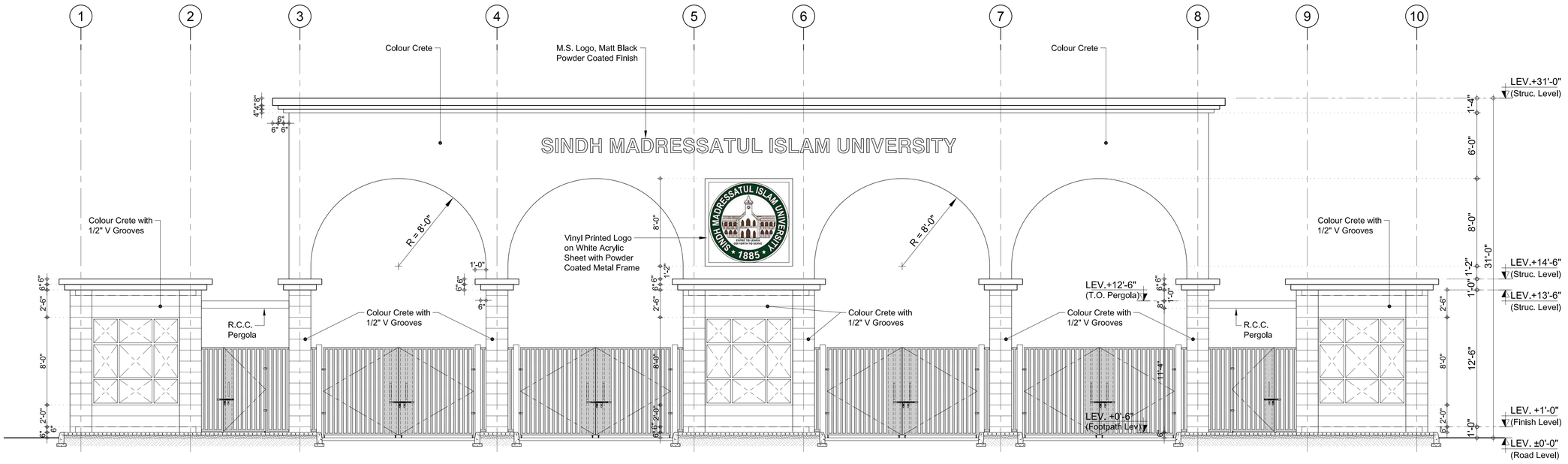
Drawing Title : SECTIONS A-A, B-B, C-C & D-D

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
MAB	FEB. 2024	3/32"=1'-0"@A3, 3/16"=1'-0"@A1
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO- A2-0010



ELEVATION - 02



ELEVATION - 01

Client :

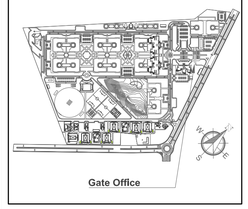
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
		REVISIONS
0	2024.09.02	Issued For Tender

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction of Karachi, Sindh, Pakistan is 267.905065° Degrees From North Clockwise

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

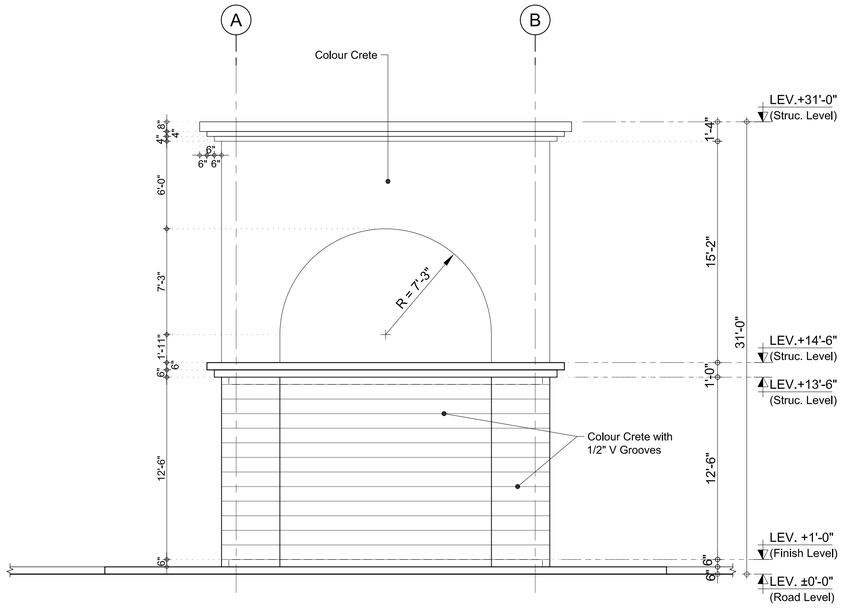
Status:
TENDER

Building Name:
GATE OFFICE

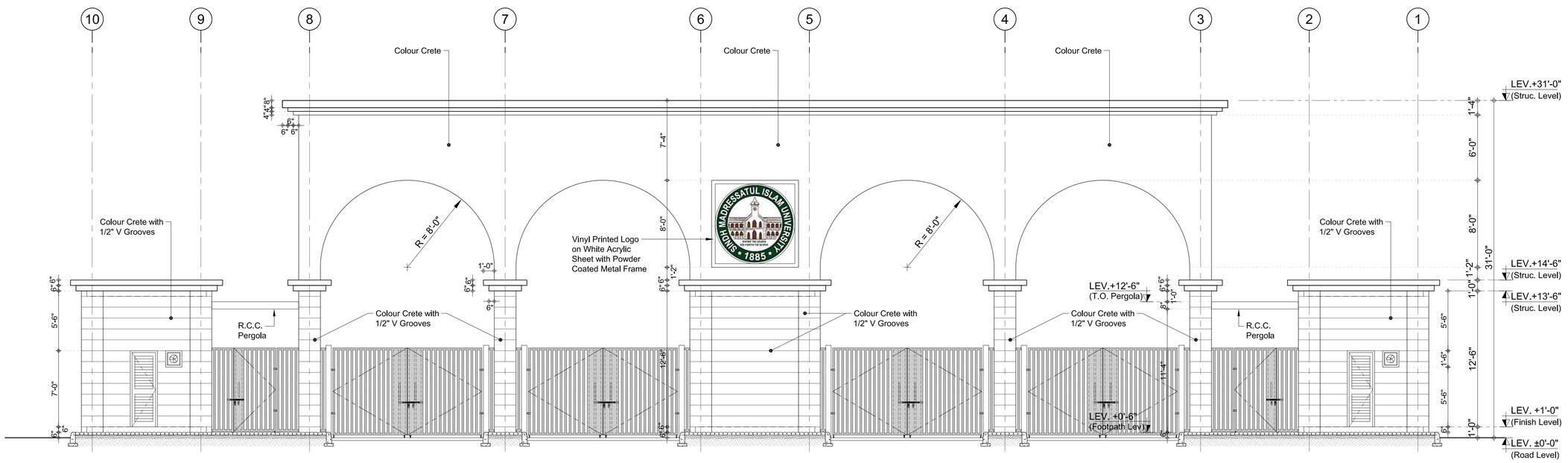
Drawing Title :
ELEVATIONS
01 & 02

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
MAB	FEB. 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code : 00986		Rev. : 0

Drawing No. :
EA-00986-SMGO- A3-0010



ELEVATION - 04



ELEVATION - 03

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN
GO FORTH TO SERVE
1885

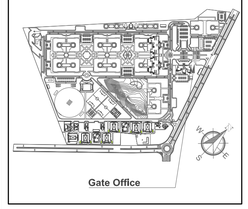
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
		REVISIONS
0	2024.09.02	Issued For Tender

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction of Karachi, Sindh, Pakistan is 267.905065° Degrees From North Clockwise

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

Status:
TENDER

Building Name:
GATE OFFICE

Drawing Title :
ELEVATIONS
03 & 04

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
MAB	FEB. 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO- A3-0020

SCHEDULE OF DOORS & WINDOWS

Schedule Of Doors

S.#	TYPE / MARK	SIZE		QUANTITY	FRAME	PANEL	HARDWARE
		WIDTH	HEIGHT				
1	**D-01**	3'-0"	7'-0"	04	Aluminum Frame	Aluminum Door with 5mm Glass & Aluminum Sheet Infill	As Per BOQ
2	**D-02**	2'-6"	7'-0"	02	Aluminum Frame	Aluminum Door with Aluminum Sheet Infill	As Per BOQ
3	**G-01**	16'-0"	8'-3"	04	M.S. Tube (Red Oxide Primer) with Matt Enamel Paint	M.S. Tube (Red Oxide Primer) with Matt Enamel Paint	As Per Design, Detail & BOQ
4	**G-02**	8'-0"	7'-9"	02	M.S. Tube (Red Oxide Primer) with Matt Enamel Paint	M.S. Tube (Red Oxide Primer) with Matt Enamel Paint	As Per Design, Detail & BOQ

Schedule Of Windows

S.#	TYPE / MARK	SIZE		QUANTITY	FRAME	PANEL	HARDWARE
		WIDTH	HEIGHT				
1	**W-01**	8'-0"	8'-0"	03	Aluminum Frame	5mm Glass, Fixed Panel (As Per Design)	As Per BOQ
2	**W-02**	2'-6"	4'-0"	04	Aluminum Frame	5mm Glass, Openable Panel (As Per Design)	As Per BOQ
3	**V-01**	1'-6"	1'-6"	02	Aluminum Frame	5mm Glass, Fixed Panel (As Per Design)	As Per BOQ

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

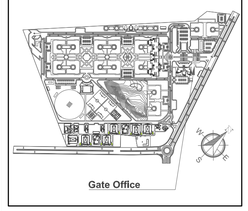
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / Inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

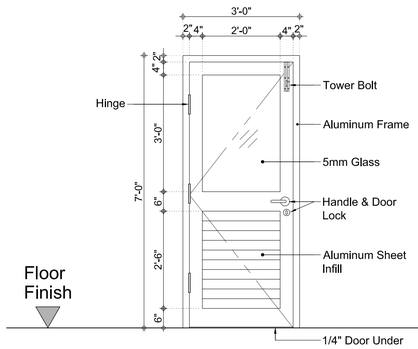
Status: **TENDER**

Building Name: **GATE OFFICE**

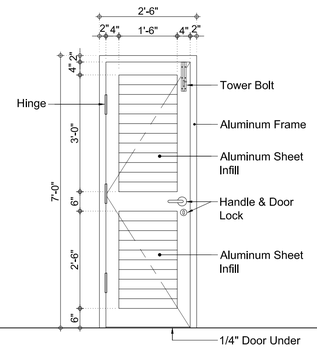
Drawing Title : SCHEDULE OF DOORS, WINDOWS & VENTILATOR

Designed : BRS	Checked : SAM	Approved : PA
Drawn : WA	Date : FEB. 2024	Scale / Sheet : 3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code : 00986		Rev. : 0

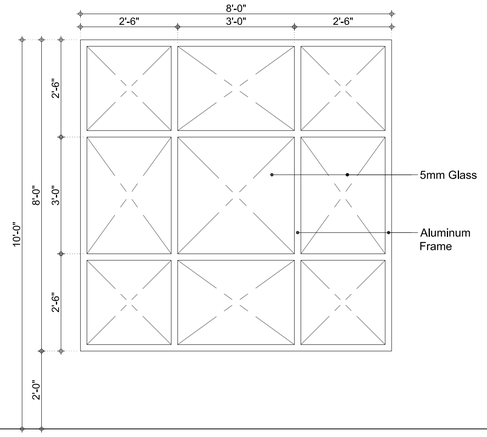
Drawing No. : EA-00986-SMGO- A6-0010



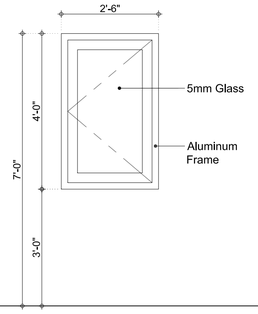
ELEVATION



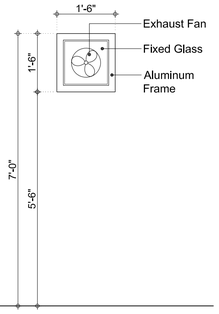
ELEVATION



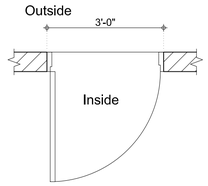
ELEVATION



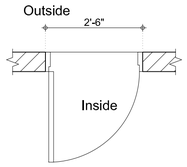
ELEVATION



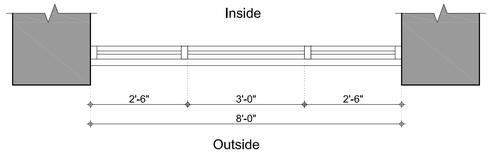
ELEVATION



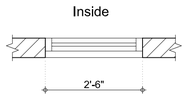
D1 PLAN
3'-0" x 7'-0"



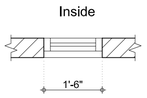
D2 PLAN
2'-6" x 7'-0"



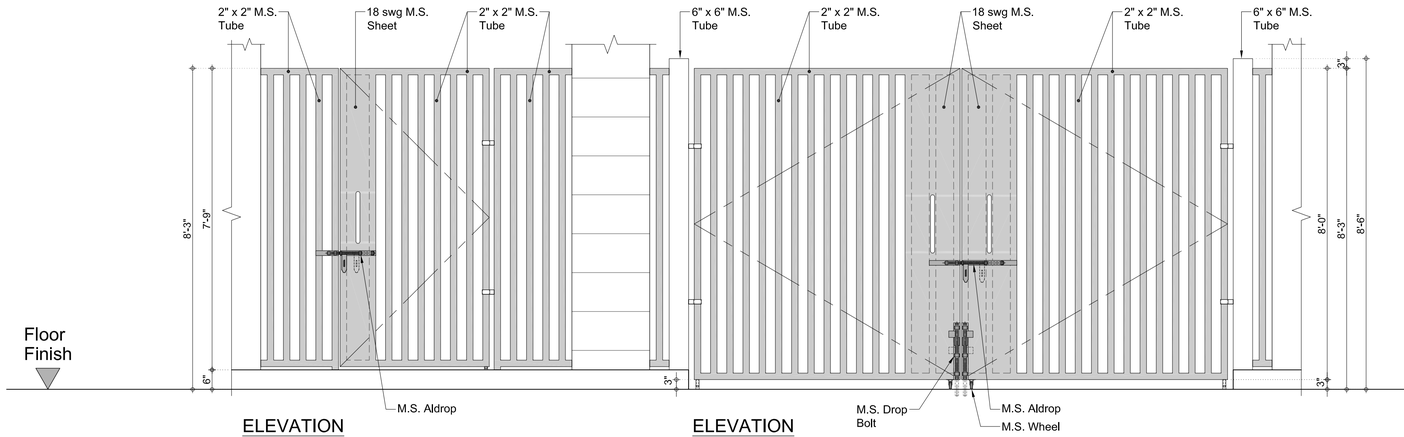
W1 PLAN
8'-0" x 8'-0"



W2 PLAN
2'-6" x 4'-0"

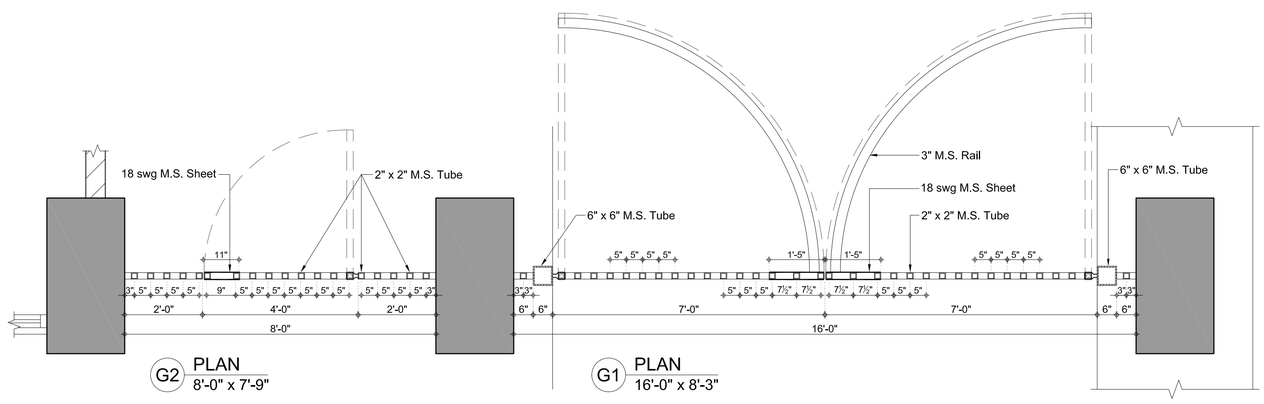


V1 PLAN
1'-6" x 1'-6"



ELEVATION

ELEVATION



G2 PLAN
8'-0" x 7'-9"

G1 PLAN
16'-0" x 8'-3"

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

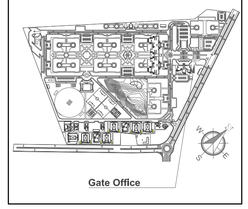
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

Status:
TENDER

Building Name:
GATE OFFICE

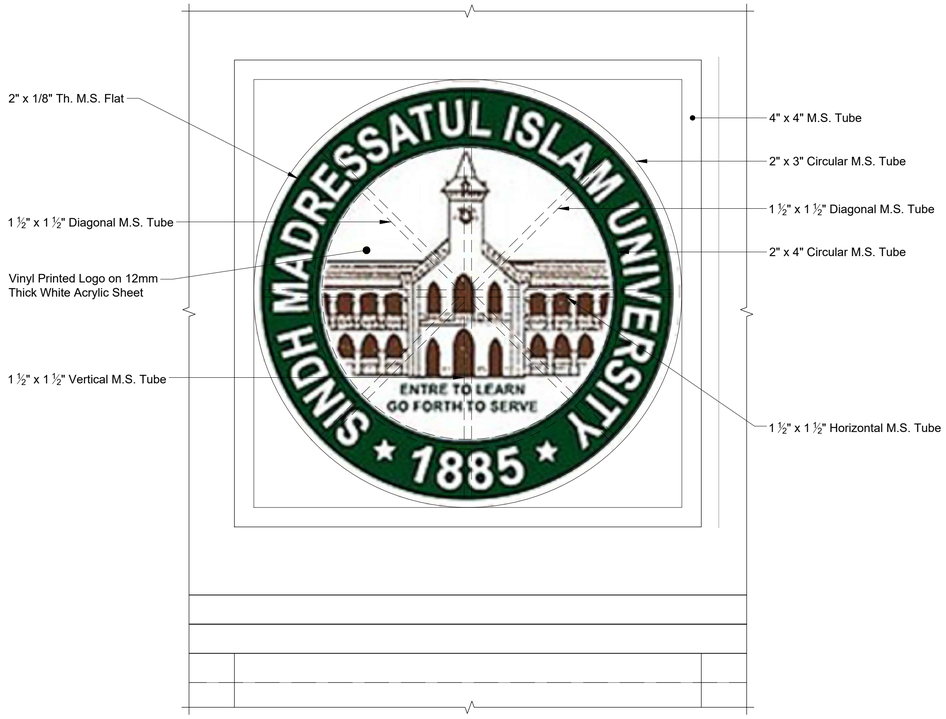
Drawing Title :

DETAIL OF DOORS, WINDOWS & VENTILATOR (PLANS & ELEVATIONS)

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet : 1/4"=1'-0"@A3, 1/2"=1'-0"@A1
WA	FEB. 2024	
Project Code : 00986		Rev. : 0

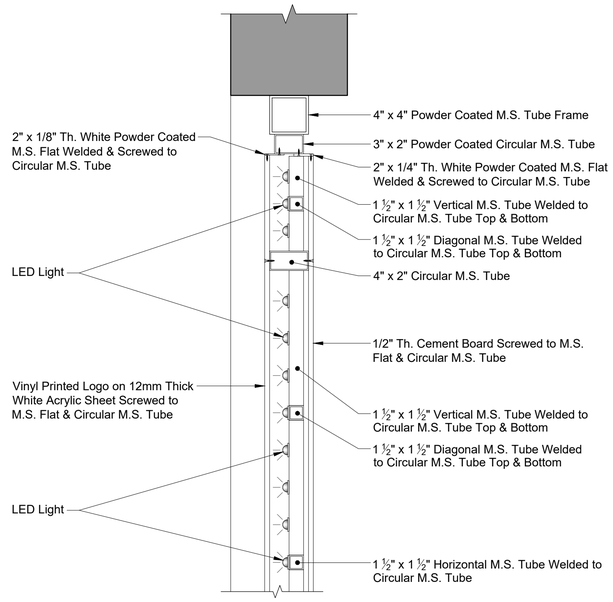
Drawing No. : EA-00986-SMGO- A6-0020

ELEVATION - 01

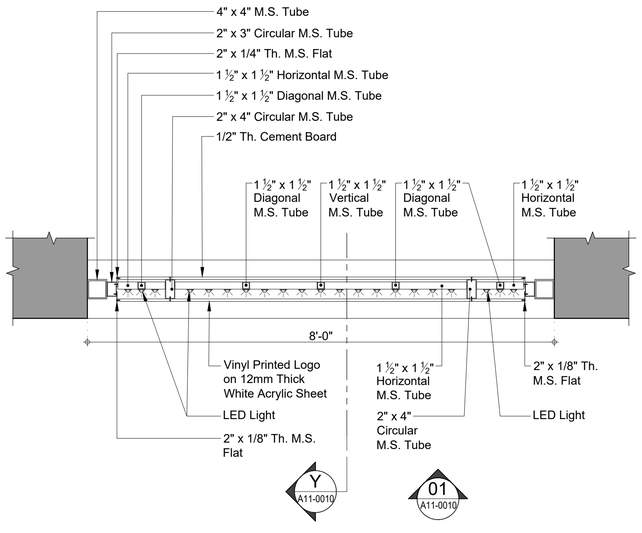


DETAIL - 01

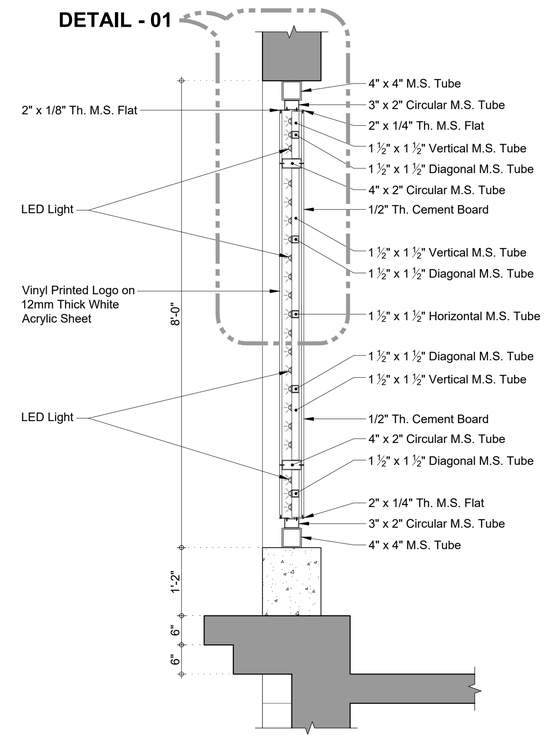
Scale: 1 ½" = 1'-0"



PLAN



SECTION - Y



Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN
GO FORTH TO SERVE
1885

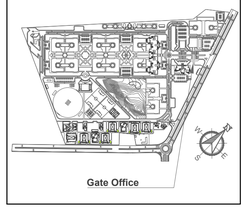
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:
Qiblah direction of Karachi, Sindh, Pakistan is 267.805066° Degrees From North Clockwise

Date of Issue	September 2024
Issued To	Client
Issued For	Tender

ARCHITECTURE

Status:
TENDER

Building Name:
GATE OFFICE

Drawing Title :
LD - 01
DETAIL OF LOGO

Designed :	Checked :	Approved :
BRS	SAM	PA
Drawn :	Date :	Scale / Sheet :
MAB	FEB. 2024	3/8"=1'-0"@A3 3/4"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-A11-0010

ELECTRICAL

S.#	DRAWING NO.	DRAWING TITLE
	E - GENERAL DRAWINGS	
1	EA-00986-SMGO-E-0001	LIST OF DRAWINGS
2	EA-00986-SMGO-E-0002	LEGEND OF ELECTRICAL SYMBOLS, ABBREVIATIONS & GENERAL NOTES
3	EA-00986-SMGO-E-0003	ELECTRICAL STANDARD DETAIL (SHEET1 OF 3)
4	EA-00986-SMGO-E-0004	ELECTRICAL STANDARD DETAIL (SHEET 2 OF 3)
5	EA-00986-SMGO-E-0005	ELECTRICAL STANDARD DETAIL (SHEET3 OF 3)
	EL - LIGHTING LAYOUT PLANS	
1	EA-00986-SMGO-EL-0100	GROUND FLOOR PLAN LIGHTING LAYOUT
	EP - POWER LAYOUT PLANS	
1	EA-00986-SMGO-EP-0100	GROUND FLOOR PLAN POWER LAYOUT

EXTRA LOW VOLTAGE

S.#	DRAWING NO.	DRAWING TITLE
	IT-TELECOMMUNICATION & NETWORKING SYSTEM LAYOUT PLANS	
1	EA-00986-SMGO-IT-0100	GROUND FLOOR PLAN TELECOMMUNICATION & NETWORKING LAYOUT PLAN
2	EA-00986-SMGO-IT-0200	TELECOMMUNICATION & NETWORKING SYSTEM SCHEMATIC DIAGRAM
3	EA-00986-SMGO-ELV-0100	SECURITY SYSTEM SCHEMATIC DIAGRAM

EXTERANAL LIGHTING

S.#	DRAWING NO.	DRAWING TITLE
	EX-EXTERNAL LIGHTING LAYOUT PLAN	
1	EA-00986-SMGO-EX-0100	GROUND FLOOR PLAN EXTERNAL LIGHTING SYSTEM LAYOUT

Client :

Sindh Madressatul Islam University

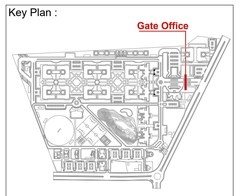
Consultant :

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

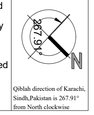
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:



Rev. No.	DATE	DESCRIPTION
		REVISIONS
00	29-08-2024	Issued For Construction

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

Building Name: GATE OFFICE

Drawing Title : LIST OF DRAWINGS

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
ZN	Aug, 2018	NTS @A1
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO- E-0001

LEGEND FOR POWER SYSTEM

SYMBOL	DESCRIPTION
	10A 2 PIN SWITCHED SOCKET OUTLET
	10A 2 PIN SWITCHED SOCKET OUTLET (MOUNTED ABOVE COUNTER TOP)
	13A 3 PIN FLAT 2-GANG SWITCHED SOCKET OUTLET
	13A SWITCHED SPUR OUTLET FOR FCU
	13A UNSWITCHED SPUR OUTLET
	15A 3 PIN SWITCHED SOCKET OUTLET
	16A 3 PIN INDUSTRIAL SOCKET
	FLOOR DISTRIBUTION BOX: 1 No 10A 2 PIN SWITCHED SOCKET OUTLET 1 No 13A 3 PIN FLAT 2-GANG SWITCHED SOCKET OUTLET 1 No DUAL RJ-45 OUTLET FOR VOICE & DATA
	20A DOUBLE POLE SWITCH
	10A SINGLE POLE SWITCH FOR MOTORIZED SCREEN
	FLEX OUTLET
	SPN ISOLATOR
	TPN ISOLATOR
	DISTRIBUTION BOARD (DB)
	SUB MAIN DISTRIBUTION BOARD (SMDB)
	MAIN DISTRIBUTION BOARD (MDB)
	POWER MANHOLE
	EARTH PIT FOR POWER
LP	EARTH PIT FOR LIGHTNING PROTECTION
	EARTH BAR WITH SINGLE DISCONNECTING LINK
SS V	SELECTOR SWITCH / VOLTMETER
A A A	AMPERE METER
R Y B	PHASE INDICATION LAMPS (R,Y,B)
	FUSE
EA	ENERGY ANALYZER
	CURRENT TRANSFORMER
	NON FERROUS CABLE GLAND PLATE
	SINGLE POLE MINIATURE CIRCUIT BREAKER (MCB)
	DOUBLE POLE MINIATURE CIRCUIT BREAKER (MCB)
	TRIPPLE POLE MINIATURE CIRCUIT BREAKER (MCB)
	MOULDED CASE CIRCUIT BREAKER (MCCB)
	AIR CIRCUIT BREAKER (ACB)
G	DIESEL GENERATOR SET

SWITCHES

SYMBOL	DESCRIPTION
	MODULER GRID SWITCHES
NS	LIGHTING CONTROL SWITCH (N GANG)
ND	FAN DIMMER (N GANG)
	20A DOUBLE POLE SWITCH
	MOTION SENSOR
PS	PHOTO SENSOR
	PUSH BUTTON
	TIMER CONTACTOR

LEGEND FOR IT SYSTEM

SYMBOL	DESCRIPTION
	SINGLE RJ45 OUTLET FOR VOICE (18" ATFL)
	SINGLE RJ45 OUTLET FOR DATA (18" ATFL)
	FLOOR DISTRIBUTION BOX: 1 No RJ45 OUTLET FOR VOICE & 1 No RJ45 OUTLET FOR DATA 1 No 13A DUAL & 1 No 5A SWITCHED SOCKET OUTLET
TV	TELEVISION POINT @ H/L
W	SINGLE RJ45 DATA OUTLET FOR WIFI @ CEILING / WALL
P	SINGLE RJ45 DATA OUTLET FOR PROJECTOR ABOVE FALSE CEILING
12U	12U TELECOM RACK (WALL MOUNTED)
42U	42U TELECOM RACK (FLOOR STANDING)
	MANHOLE FOR TELECOM (2'-0"x2'-0")
	CCTV FIXED CAMERA TYPE (WALL MOUNTED)
	CCTV DOME CAMERA TYPE
	IP BASED PTZ CAMERA
ACS	ACCESS CONTROL PANEL (2 DOOR)
CR	PROXIMATELY CARD READER
	DOOR LOCK UNIT
PB	PUSH BUTTON

LEGEND FOR FA, PA & EM LIGHTING SYSTEMS

SYMBOL	DESCRIPTION
	ANALOGUE INTELLIGENT ADDRESSABLE SMOKE DETECTOR
	ANALOGUE INTELLIGENT ADDRESSABLE HEAT DETECTOR
	WALL SOUNDER WITH FLASHER / STROBE WEATHER PROOF TYPE
	WALL SOUNDER WITH FLASHER / STROBE
	ANALOGUE INTELLIGENT ADDRESSABLE MANUAL PULL STATION/CALL POINT
	ANALOGUE INTELLIGENT ADDRESSABLE MANUAL PULL STATION/CALL POINT WEATHER PROOF TYPE
FACP	FIRE ALARM CONTROL PANEL (ADDRESSABLE)
RFAP	REPEATER FIRE ALARM PANEL
IF ZCV	ZONE CONTROL VALVE
IF FD	FOR FIRE DAMPER
CS	CEILING SPEAKER (6W) FOR PA / VA SYSTEM
	PUBLIC ADDRESS HRON SPEAKER WALL MOUNTED (30W)
	PUBLIC ADDRESS HRON SPEAKER WALL MOUNTED IP65 (30W)
	PUBLIC ADDRESS SPEAKER WALL MOUNTED (30W)
	EMERGENCY MICROPHONE
	GOOSENECK MICROPHONE
PA/VA	PA / VA RACK
	POWER AMPLIFIER
EM	EMERGENCY LIGHT (CEILING / RECESSED) 1x8W (IP20 LED LAMP)
EM	EMERGENCY LIGHT (CEILING / RECESSED) 1x8W (IP65 LED LAMP)
EM	EMERGENCY LIGHT (WALL MOUNTED) 1x8W (IP20 LED LAMP)
EM	EMERGENCY LIGHT (WALL MOUNTED) 1x8W (IP65 LED LAMP)
EXIT / EXIT	DIRECTIONAL PANDENT 1x8W EXIT LIGHT (IP-65) ; W/P DENOTES WEATHER PROOF LED TYPE

CONDUIT AND HOME RUNS

SYMBOL	DESCRIPTION
	CONDUIT CONCEALED IN FLOOR
	CONDUIT CONCEALED IN CEILING (SLAB) OR WALL
R1,Y1 (DB-N, EDB-N)	CONDUIT OR CABLE RUN TO DISTRIBUTION BOARD (R1,Y1,B1) INDICATES REFERENCE CIRCUIT. (DB-N)- INDICATES DISTRIBUTION BOARD NAME
	CONDUIT OR CABLE RUN TO EQUIPMENT AS INDICATED OR CONTINUED AS INDICATED

LEGEND FOR LIGHTING

SYMBOL	DESCRIPTION	LAMP	MOUNTING
BL	BOLARD LIGHT FIXTURE, BODY MADE OF POLYCARBONATE (IP-54)	1x15W LED	GROUND LEVEL
D1	DOWNLIGHT FIXTURE(IP-44)	1x12W LED	CEILING SURFACE
D2	DOWNLIGHT FIXTURE ALUMINUM HOUSING(IP-20)	1x30W LED	CEILING SURFACE
LD1	1'x4' BATTEN LIGHT FIXTURE EXTRUDED POLYCARBONATE WITH CLEAR LENS (IP-20)	1x40W LED	CEILING SURFACE
FS1	FLOOD LIGHT, DIE CAST ALUMINUM WITH PC DIFFUSER (IP-66)	1x100W LED	WAL SURFACE
ST1	STRIP LIGHT FIXTURE (IP-66)	12W PER METER	SURFACE
	CEILING FAN	56"	CEILING SURFACE
	EXHAUST FAN		WALL
NS ND	LIGHTING CONTROL SWITCH (N GANG) / FAN DIMMER (N DIMMER)		WALL

LEGEND FOR LIGHTNING PROTECTION & EARTHING

SYMBOLS	DESCRIPTION
	EARTH PIT
	COPPER EARTH BAR
LP	EARTH PIT FOR LIGHTNING PROTECTION
MDB	EARTH PIT FOR POWER EARTH
MDF	CLEAN EARTH PIT FOR MDF
	DOWN CONDUCTOR
LP	ROD TRIANGLE EARTH TERMINATIONSYSTEM

NOTES:

1. EARTH RESISTANCE OF LIGHTNING PROTECTION SYSTEM TO BE LESS THAN 10 OHMS. AND FOR POWER EARTHING SYSTEM TO BE LESS THAN 1 OHM.
2. ALL EXPOSED METAL STRUCTURES ON ROOF INCLUDING WINDOW CLEANING MACHINE ARE TO BE BONDED TO LIGHTNING PROTECTION SYSTEM AS PER SPECIFICATIONS.
3. BUILDING FACADE METAL WORK IS TO BE BONDED TO LIGHTNING PROTECTION SYSTEM THROUGHOUT.
4. TEST LINK IS TO BE PROVIDED FOR DOWN CONDUCTORS AT LOWEST LEVEL AND CONNECTED TO EARTHING PITS.

GENERAL NOTES

1.1- THE FOLLOWING NOTES SHALL APPLY TO ALL THE ELECTRICAL DRAWINGS UNLESS OTHERWISE INDICATED OR NOTED.
1.2- DO NOT SCALE FROM THE LAYOUT DWGS. WORK ACCORDING TO ARCHITECTURAL AND ELECTRICAL DETAILS, UNLESS OTHERWISE INDICATED.
1.3- THE ELECTRICAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE REST OF THE DRAWINGS PERTAINING TO ARCHITECTURE, STRUCTURE, AIRCONDITIONING, PLUMBING, AND AS PER SPECIFICATIONS.

2.1- UNLESS OTHERWISE INDICATED ALL CONDUITS SHOWN ON DRAWINGS SHALL BE RIGID NON- METALLIC PVC. CONDUITS.
2.2- ALL EXPOSED CONDUITS SHALL BE RIGID GALVANIZED IRON UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2.3- EARTH CONTINUITY SHALL BE IN ACCORDANCE WITH THE IEE REGULATIONS AND AS PER SPECIFICATION.
2.4- LIGHTING OUTLETS SHALL BE EXPOSED OR CONCEALED IN ACCORDANCE TO ASSOCIATED CONDUITS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2.5- SHAPE AND DIMENSION OF SYMBOLIZED LIGHT FIXTURES DO NOT NECESSARILY REPRESENT SHAPE AND DIMENSIONS OF ACTUAL FIXTURES INTENDED FOR THIS PURPOSE.
2.6- FOR EMERGENCY LIGHTING SELF CONTAIN LIGHTING IS TO BE FEED FROM NEAREST DB CIRCUIT.

3.1- MOUNTING HEIGHTS OF SOCKET OUTLETS, SWITCHES & DBs SHALL BE AS SHOWN IN ELECTRICAL STANDARD DETAIL DRAWING OR AS DIRECTED BY ENGINEER ON SITE.

4.1- THE MINIMUM CONDUIT SIZE USED SHALL BE Ø 20mm.
4.2- CONTRACTOR SHALL PROVIDE THE REQUIRED CONDUIT SIZE WHEREVER NOT INDICATED FOR THE EASE OF PULLING OF CABLES.
4.3- ALL OPENINGS, SLEEVES AND SHAFTS BETWEEN FLOORS USED FOR POWER & LOW CURRENT CABLES SHALL BE SEALED WITH FIRE RESISTANT MATERIAL OR CHEQUERED PLATE TO THE APPROVAL OF ENGINEER.
4.4- ALL BREAKERS PROTECTING MOTORS SHALL BE MOTOR PROTECTOR TYPE .
4.5- CONTRACTOR SHALL PROVIDE EMPTY CONDUITS OF PROPER SIZE FOR CONTROL WIRES SERVING ALL MECHANICAL. EQUIPMENT, A/C UNITS ETC. FULLY CO- ORDINATED WITH MECHANICAL SERVICES, REQUIREMENTS.
4.6- FOR ELV & IT SYSTEM MINIMUM CONDUIT SIZE IS 1"DIA.

ABBREVIATION

WP	WEATHER PROOF
DN	DOWN CONDUIT
UP	UP CONDUIT
CFL	COMPACT FLUORESCENT LAMP
HDGI	HOT DIP GALVANIZED IRON
CWTP	COLD WATER TRANSFER PUMP
SP	SUMP PUMP
IP	IRRIGATION PUMP
FP	FIRE PUMP
JP	JOCKEY PUMP
SF	SUPPLY FAN
EF	EXHAUST FAN
CL	CONNECTED LOAD
DL	DEMAND LOAD
DDL	DIVERSIFIED DEMAND LOAD
TCL	TOTAL CONNECTED LOAD
TDL	TOTAL DEMAND LOAD
TDDL	TOTAL DIVERSIFIED DEMAND LOAD

MINIMUM REQUIREMENT OF CONDUIT SIZES SHALL BE AS TABULATED BELOW:

CABLE SIZE	CONDUIT SIZE				
CONDUCTOR SIZE	20mm Ø	25mm Ø	32mm Ø	38mm Ø	50mm Ø
	MAXIMUM No. OF CABLES				
2.5 mm²	5	10	–	–	–
4.0 mm²	4	5	–	–	–
6.0 mm²	3	5	–	–	–
10.0 mm²	2	3	5	–	–
16.0 mm²	–	2	4	5	–
25.0 mm²	–	–	3	4	–
35.0 mm²	–	–	2	3	5
50.0 mm²	–	–	–	–	4

Client :

Sindh Madressatul Islam University

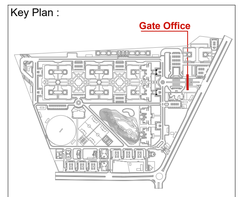
Consultant :

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

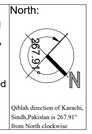
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:



Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction
REVISIONS		

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

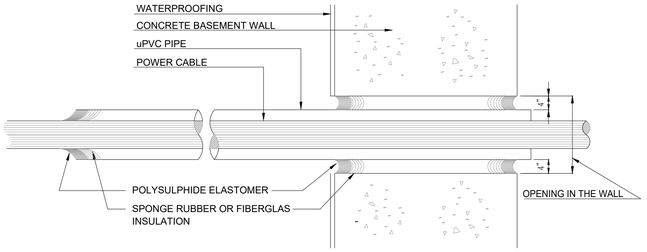
ELECTRICAL

Status: Construction

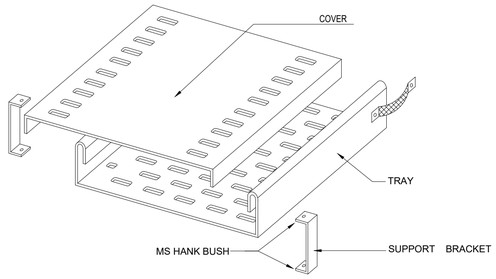
Building Name: GATE OFFICE

Drawing Title : LEGEND OF ELECTRICAL SYMBOLS, ABBREVIATIONS & GENERAL NOTES

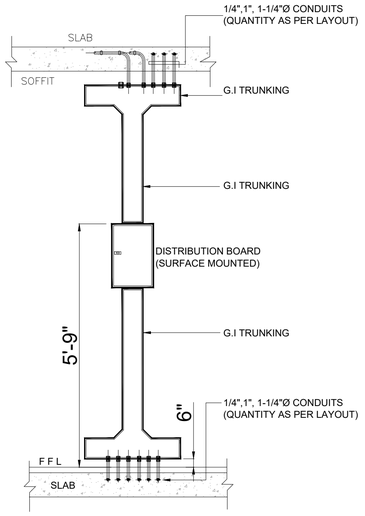
Designed : SK	Checked : SK	Approved : JIS
Drawn : MA	Date : Aug, 2018	Scale / Sheet : NTS @A1
Project Code : 00986		Rev. : 0
Drawing No. : EA-00986-SMGO- E-0002		



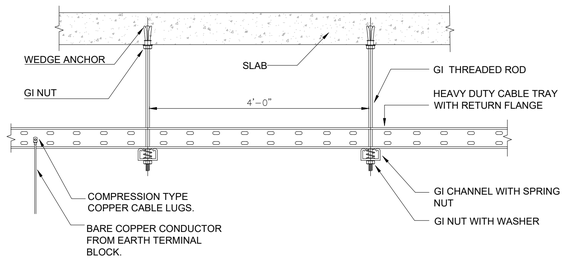
DETAIL OF WALL OPENING FOR POWER CABLE



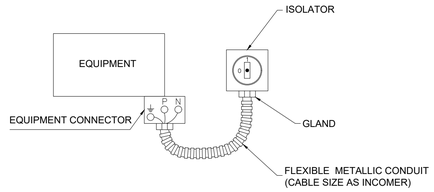
CABLE TRAY DETAIL



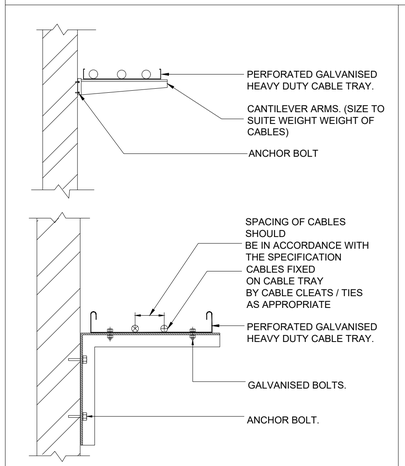
SURFACE MOUNTED TYPE DISTRIBUTION BOARD MOUNTING DETAIL.



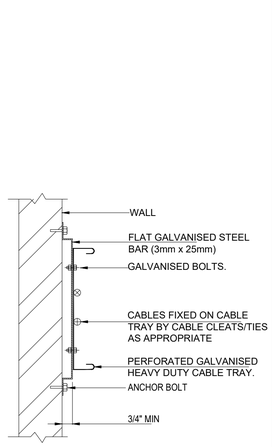
CABLE TRAY FIXING DETAILS



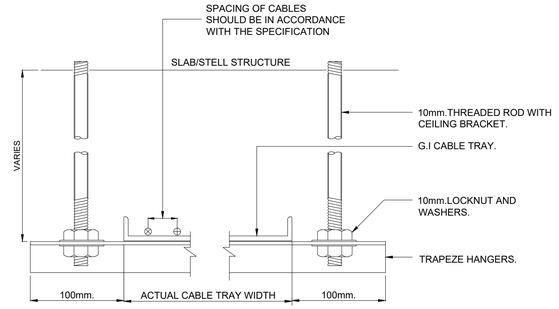
TYPICAL CONNECTION BETWEEN ISOLATOR & EQUIPMENT



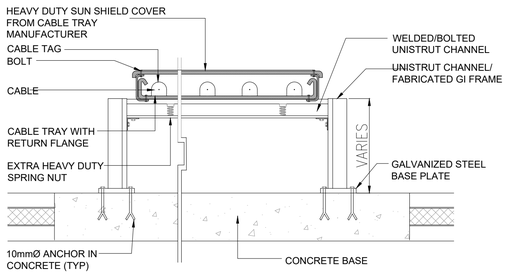
GALVANISED CABLE TRAY FIXED HORIZONTAL ON VERTICAL WALL



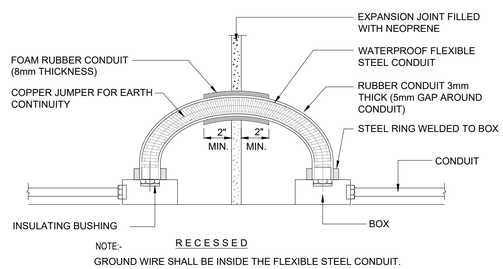
GALVANISED CABLE TRAY FIXED FLAT ON VERTICAL WALL



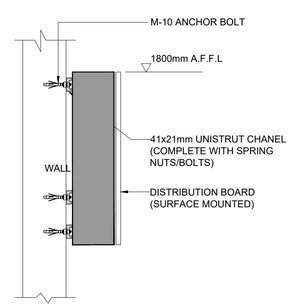
MOUNTING ARRANGEMENT OF CABLE TRAY SUSPENDED FROM CEILING SLAB / PURLINGS



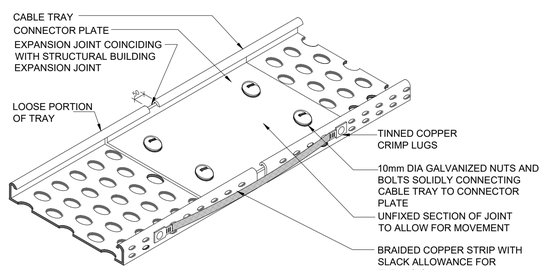
FLOOR CABLE TRAY DETAIL



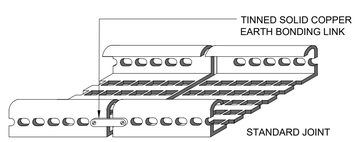
CONDUIT EXPANSION CONNECTION



DISTRIBUTION BOARD FIXING DETAIL



CABLE TRAY CROSSING BUILDING EXPANSION JOINT



CABLE TRAY EXPANSION BONDING

Client :

Sindh Madressatul Islam University

Consultant :

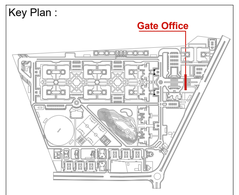
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

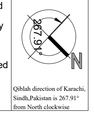
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:



Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

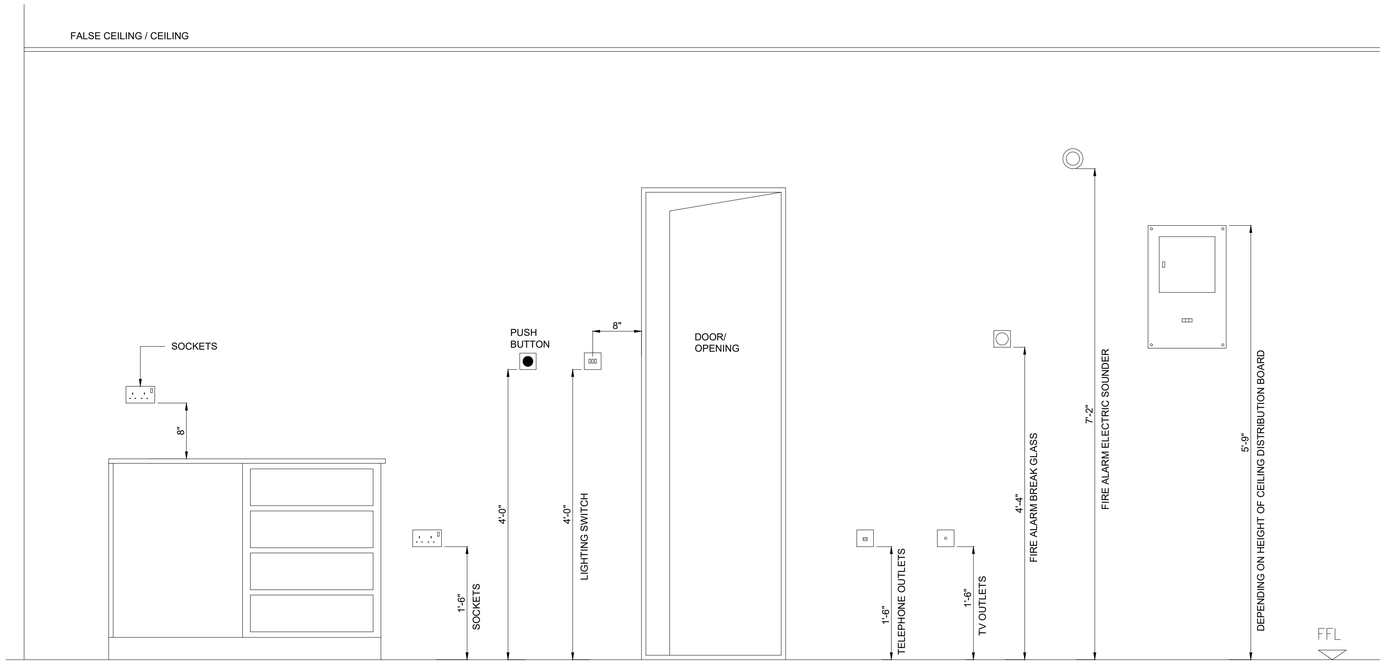
Status: Construction

Building Name: GATE OFFICE

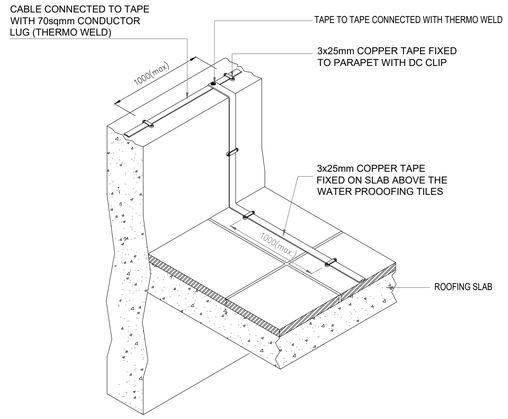
Drawing Title : ELECTRICAL STANDARD DETAIL (SHEET 1 OF 3)

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
MA	Aug, 2018	NTS @A1
Project Code : 00986		Rev. : 0

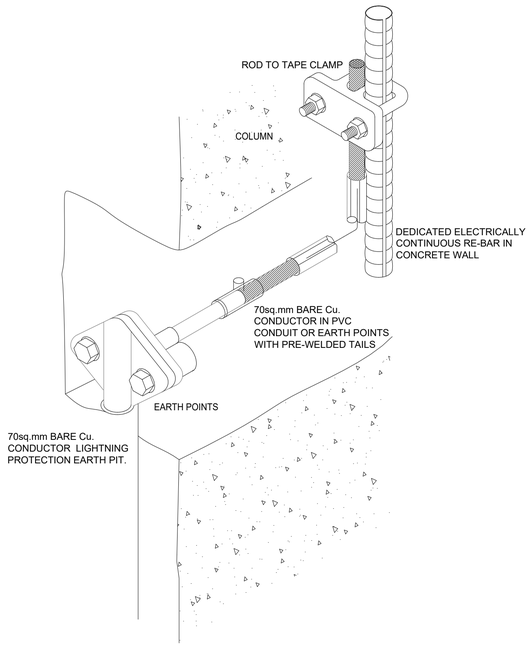
Drawing No. : EA-00986-SMGO- E-0003



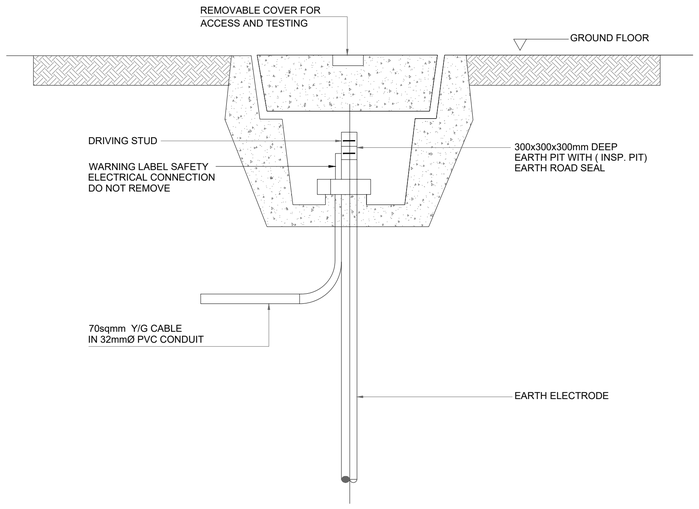
STANDARD MOUNTING HEIGHTS OF ELECTRICAL ACCESSORIES



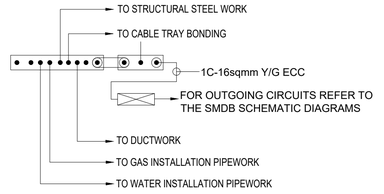
COPPER TAPE FIXED ON PARAPET AND WATER PROOFING AREA



BONDING DETAIL FOR EARTH POINTS TO DEDICATED COLUMN REBAR.



EARTHING PIT



DETAIL OF TYP. FLOOR ELECTRICAL ROOM EARTH BAR

Client :

Sindh Madressatul Islam University

Consultant :

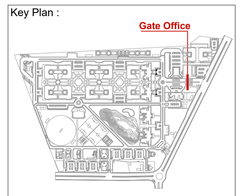
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

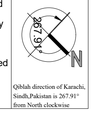
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:



Qiblah direction of Karachi, Sindh,Pakistan is 245°/65° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction
	REVISIONS	

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

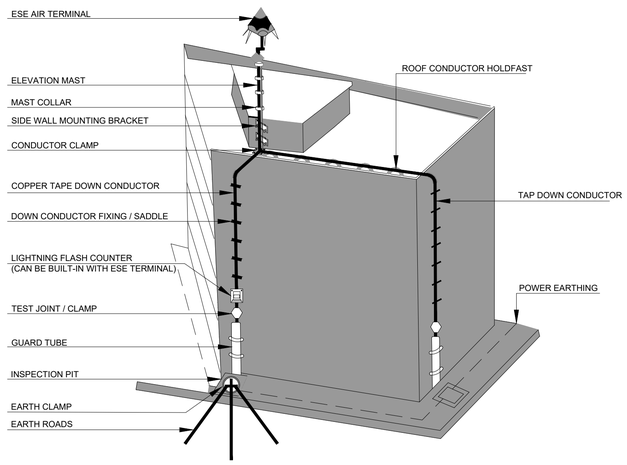
Status: Construction

Building Name: GATE OFFICE

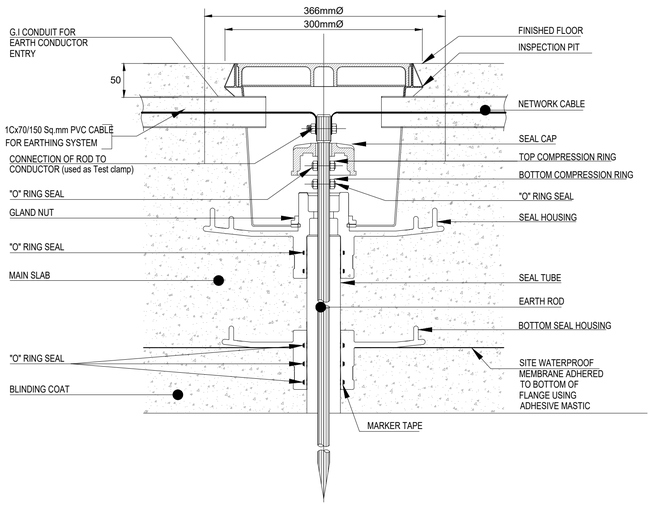
Drawing Title : ELECTRICAL STANDARD DETAIL (SHEET 2 OF 3)

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
MA	Aug, 2018	NTS @A1
Project Code : 00986		Rev. : 0

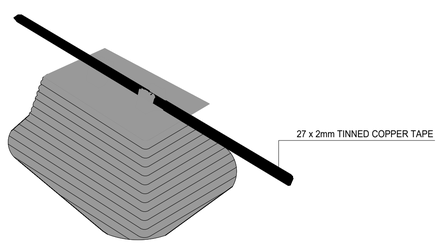
Drawing No. : EA-00986-SMGO- E-0004



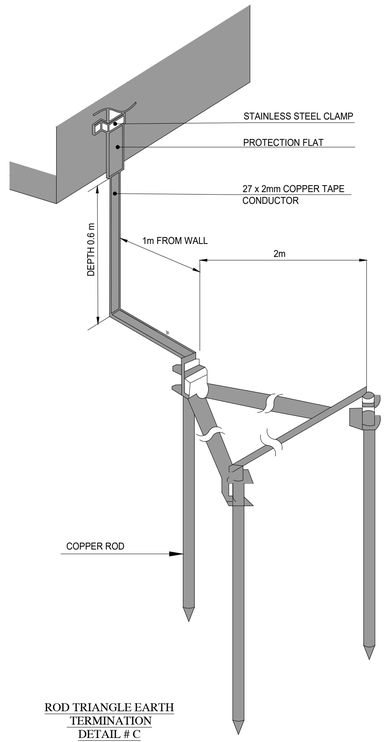
ESE LIGHTNING PROTECTION
DETAIL # A



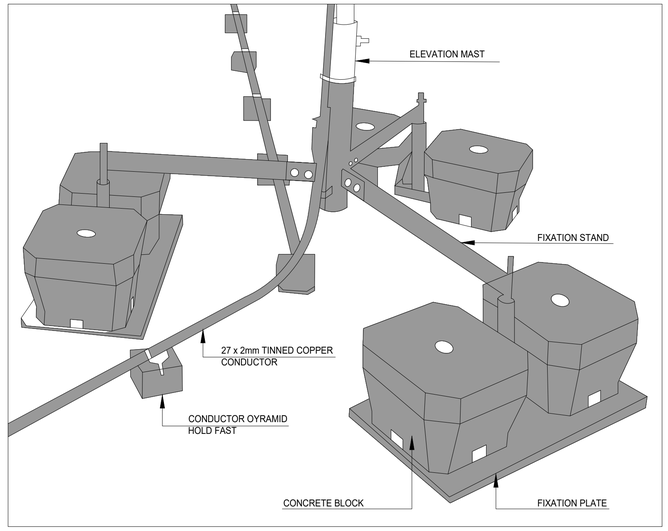
STANDARD DOUBLE FLANGE EARTH PIT
DETAIL # B



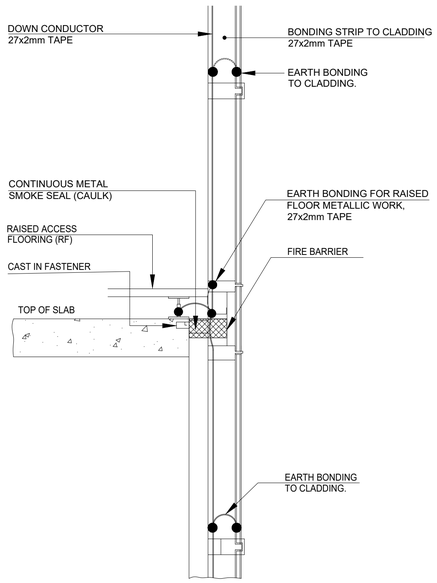
CONDUCTOR PYRATVED HOLD FAST
DETAIL # C



ROD TRIANGLE EARTH
TERMINATION
DETAIL # C



ELEVATION MAST FIXATION
DETAIL # D



DOWN CONDUCTOR AND DETAIL
CURTAIN WALL BONDING
DETAIL # E

Client :

Sindh Madressatul Islam University

Consultant :

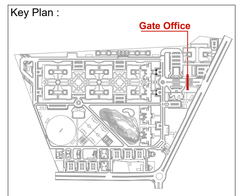
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

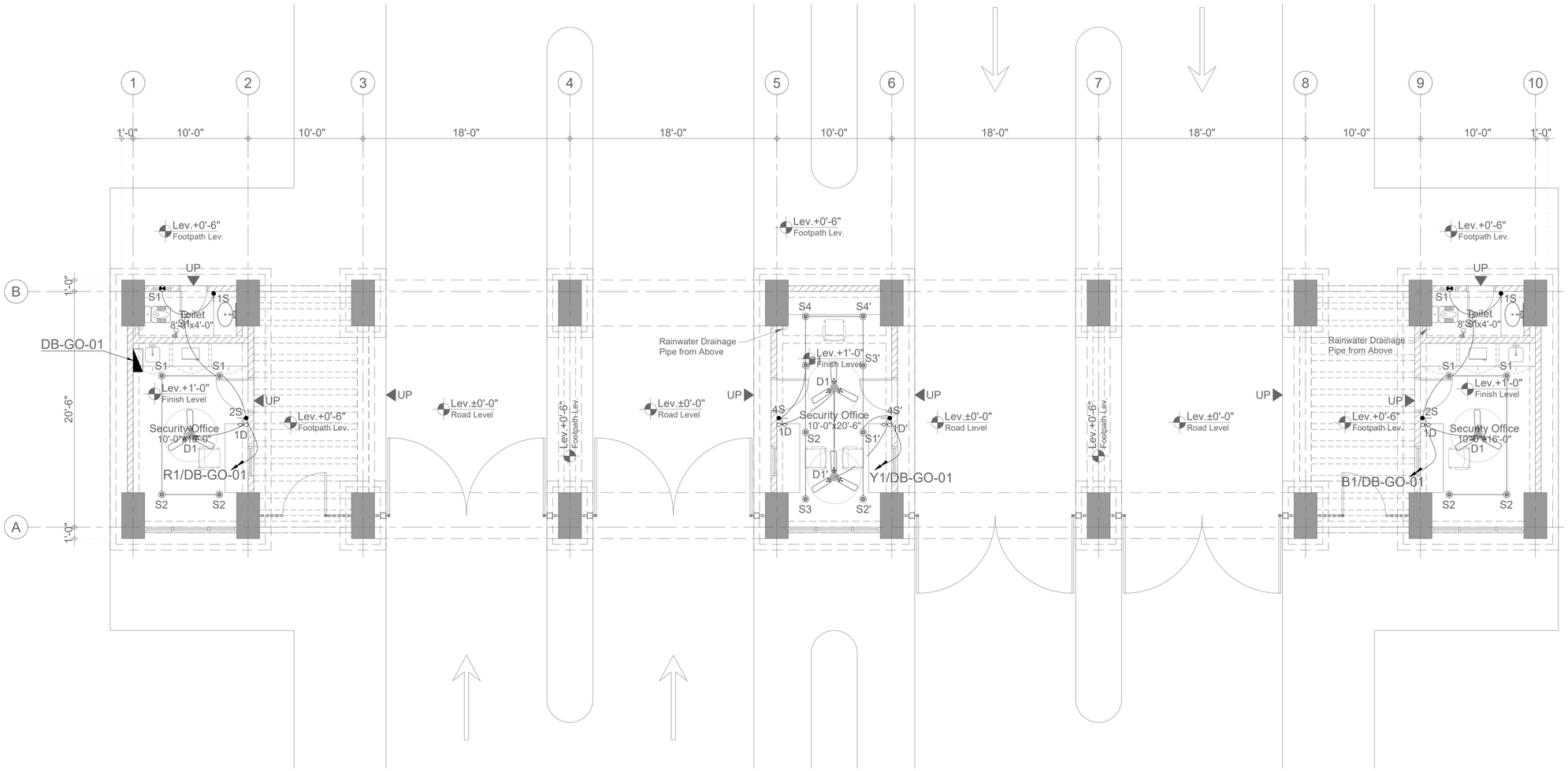
Building Name: GATE OFFICE

Drawing Title : ELECTRICAL STANDARD DETAIL (SHEET 3 OF 3)

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
MA	Aug, 2018	NTS @A1
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO- E-0005

UNIVERSITY PREMISES



APPROACH ROAD

LEGEND FOR LIGHTING

S.No.	SYMBOL	DESCRIPTION	LAMP	MOUNTING
1	D1	DOWNLIGHT FIXTURE, METAL HOUSING WITH PC LIGHT DIFFUSER (IP-20)	1x18W LED	CEILING RECESSED
2	D2	DOWNLIGHT FIXTURE (IP-44)	1x12W LED	CEILING SURFACE
3	D3	DECORATIVE TYPE DOWNLIGHT FIXTURE WITH PMMA DIFFUSER (IP-20)	1x12W LED	CEILING SURFACE
4	D4	DOWNLIGHT FIXTURE, METAL HOUSING WITH PC LIGHT DIFFUSER (IP-20)	1x15W LED	CEILING SURFACE
5	FS1	FLOOD LIGHT, DIE CAST ALUMINUM WITH PC DIFFUSER (IP-66)	1x100W LED	WAL SURFACE
6	W1	WALL LIGHT WEATHER PROOF LIGHT FIXTURE DIE CAST ALUMINUM (IP-54)	1x12W LED	WALL / SURFACE
7	W2	WALL LIGHT WEATHER PROOF LIGHT FIXTURE BODY MADE OF POLYCARBONATE (IP-54)	1x15W LED	WALL / SURFACE
8		CEILING FAN	56"	CEILING SURFACE
9		EXHAUST FAN		WALL
10	IN5 / GND	LIGHTING CONTROL SWITCH (N GANG) / FAN DIMMER (N DIMMER)		WALL
11	ST1	STRIP LIGHT FIXTURE (IP-66)	12W PER METER	SURFACE

NOTES:-

1. ALL FINISHES OF LIGHT FIXTURES AND COLOUR TEMPERATURE OF LAMPS SHALL BE SUBJECT TO ARCHITECT'S APPROVAL .
2. FOR FINAL LOCATION OF DBs REFER TO POWER DRAWINGS.

Client :

Sindh Madressatul Islam University

Consultant :

EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :

Note:

- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

Building Name: GATE OFFICE

Drawing Title :

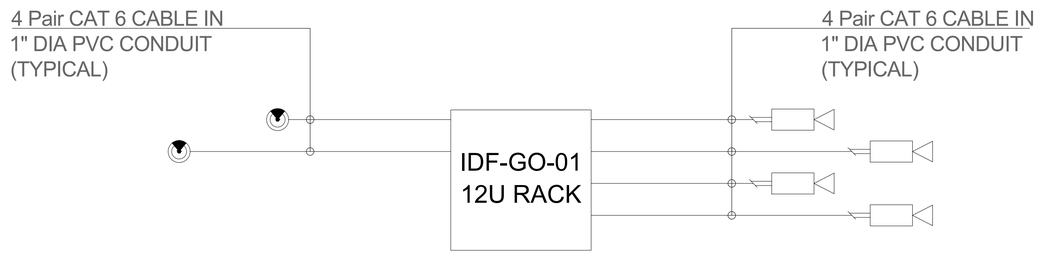
GROUND FLOOR PLAN LIGHTING LAYOUT

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
MA	Aug, 2018	1/16"=1'-0"@A3 1/8"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. : EA-00986-SMGO-EL-0100

SECURITY SYSTEM SCHEMATIC DIAGRAM

ROOF



GROUND FINISH
FLOOR LEVEL

Client :

Sindh Madressatul Islam University

Consultant :

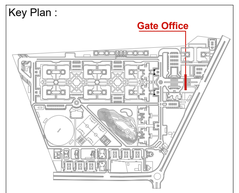
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:

- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	December, 2018
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

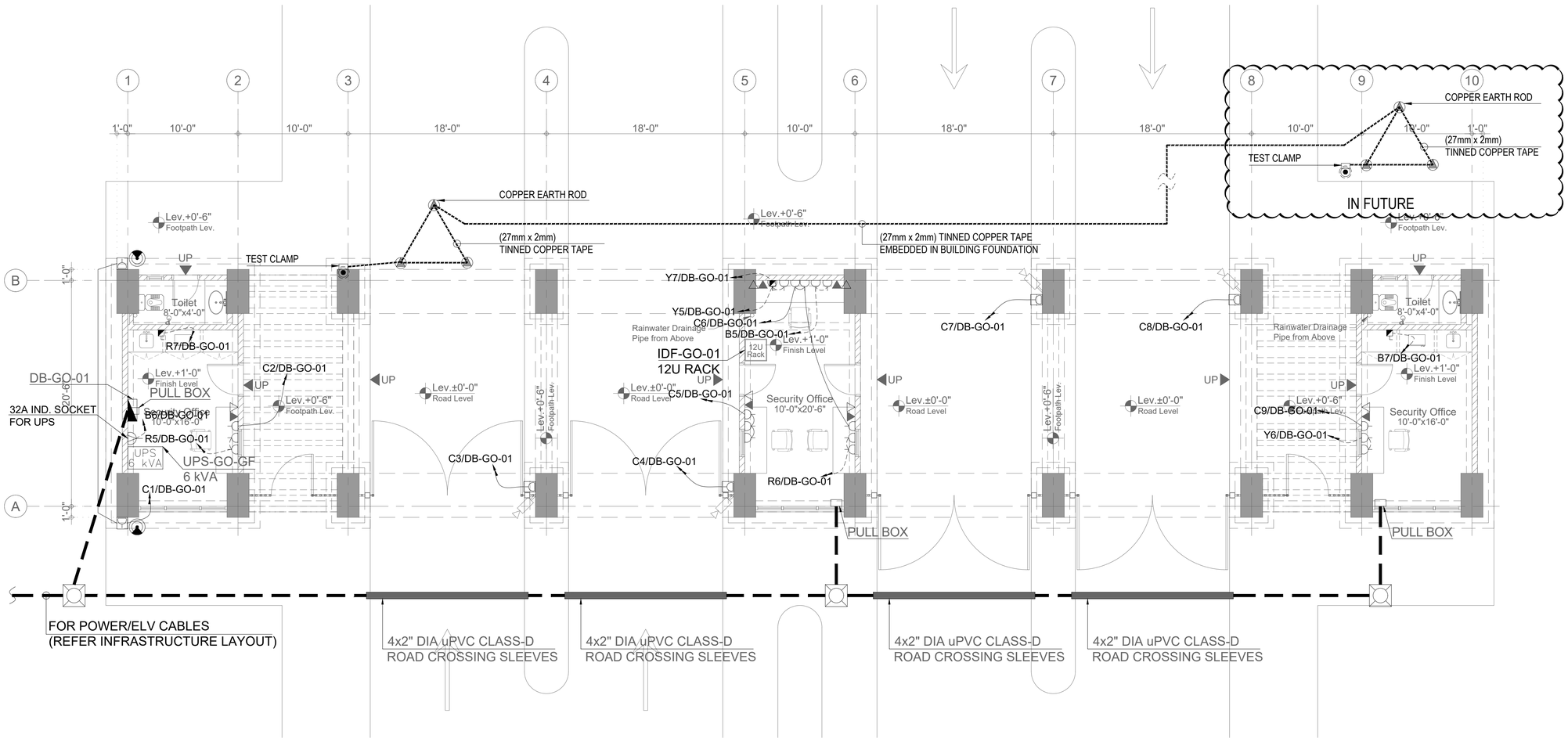
Building Name: GATE OFFICE

Drawing Title : SECURITY SYSTEM SCHEMATIC DIAGRAM

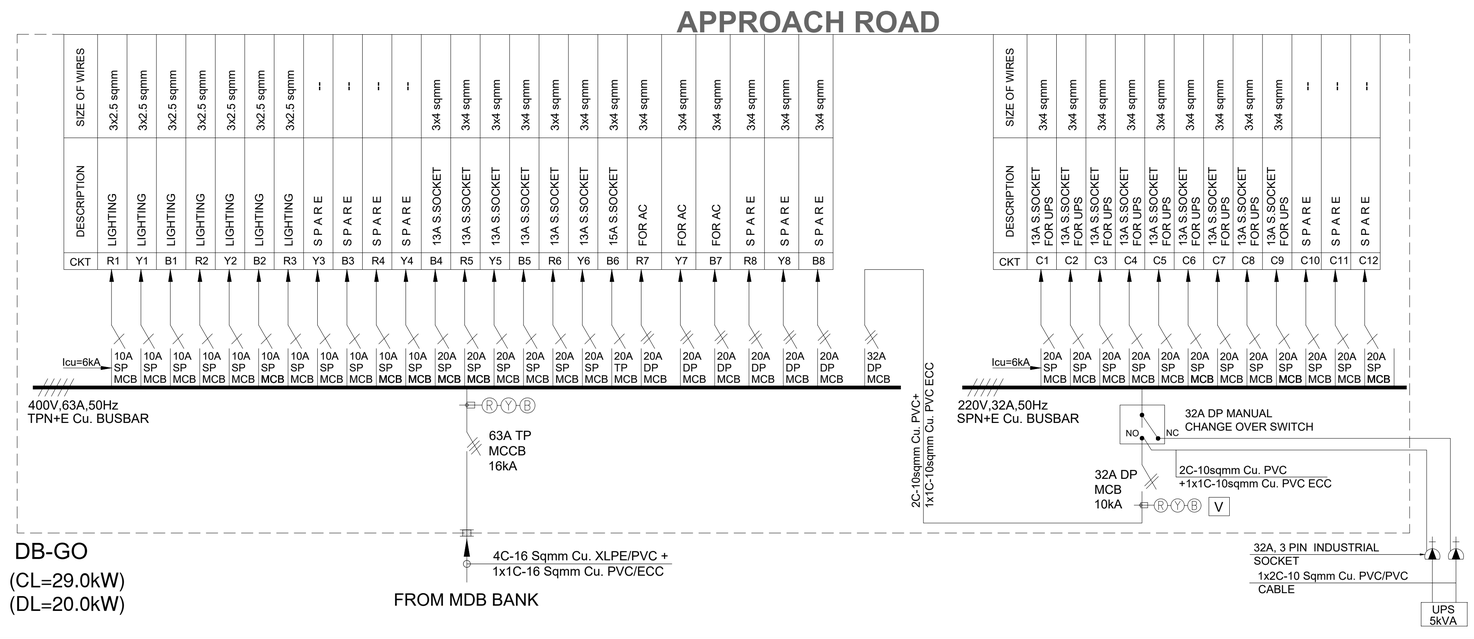
Designed : AJ	Checked : AJ	Approved : JIS
Drawn : ZN	Date : Aug, 2018	Scale / Sheet : NTS @A3 NTS @A1
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO-ELV-0100

UNIVERSITY PREMISES



APPROACH ROAD



Client :

Sindh Madressatul Islam University

Consultant :

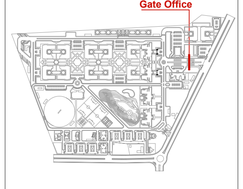
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

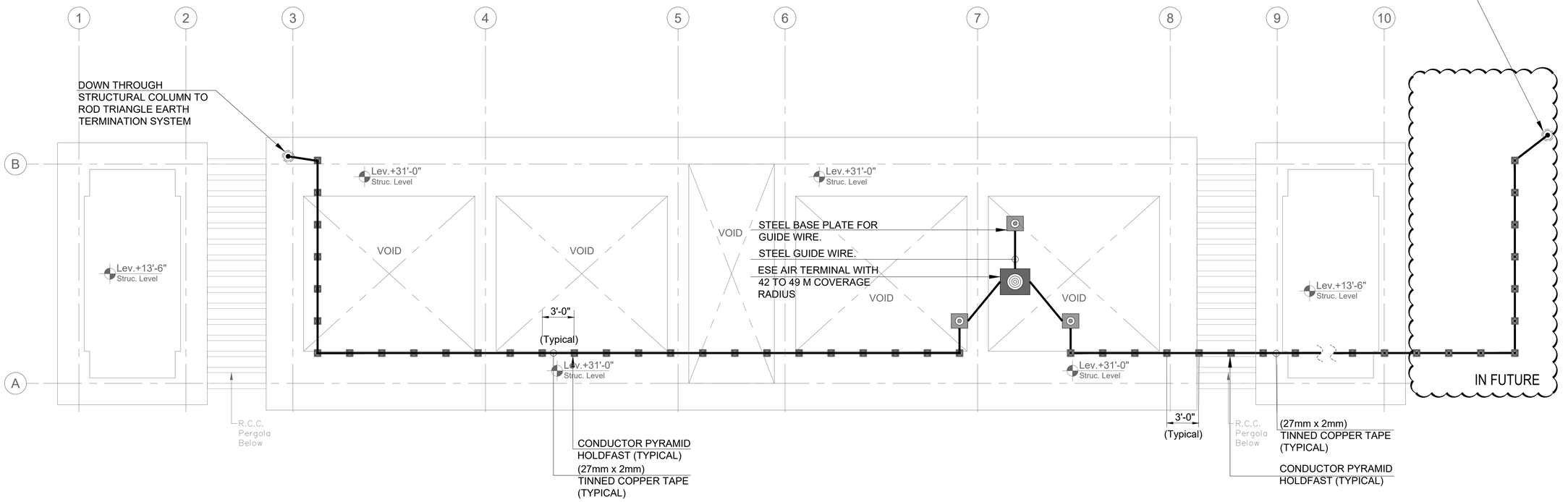
Status: Construction

Building Name: GATE OFFICE

Drawing Title : GROUND FLOOR PLAN POWER LAYOUT

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
ZN	Aug, 2018	1/16"=1'-0" @A3 1/8"=1'-0" @A1
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO-EP-0100



Client :

Sindh Madressatul Islam University

Consultant :

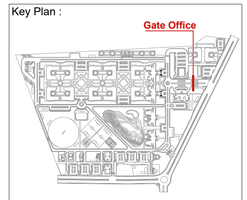
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION

REVISIONS

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

Building Name:

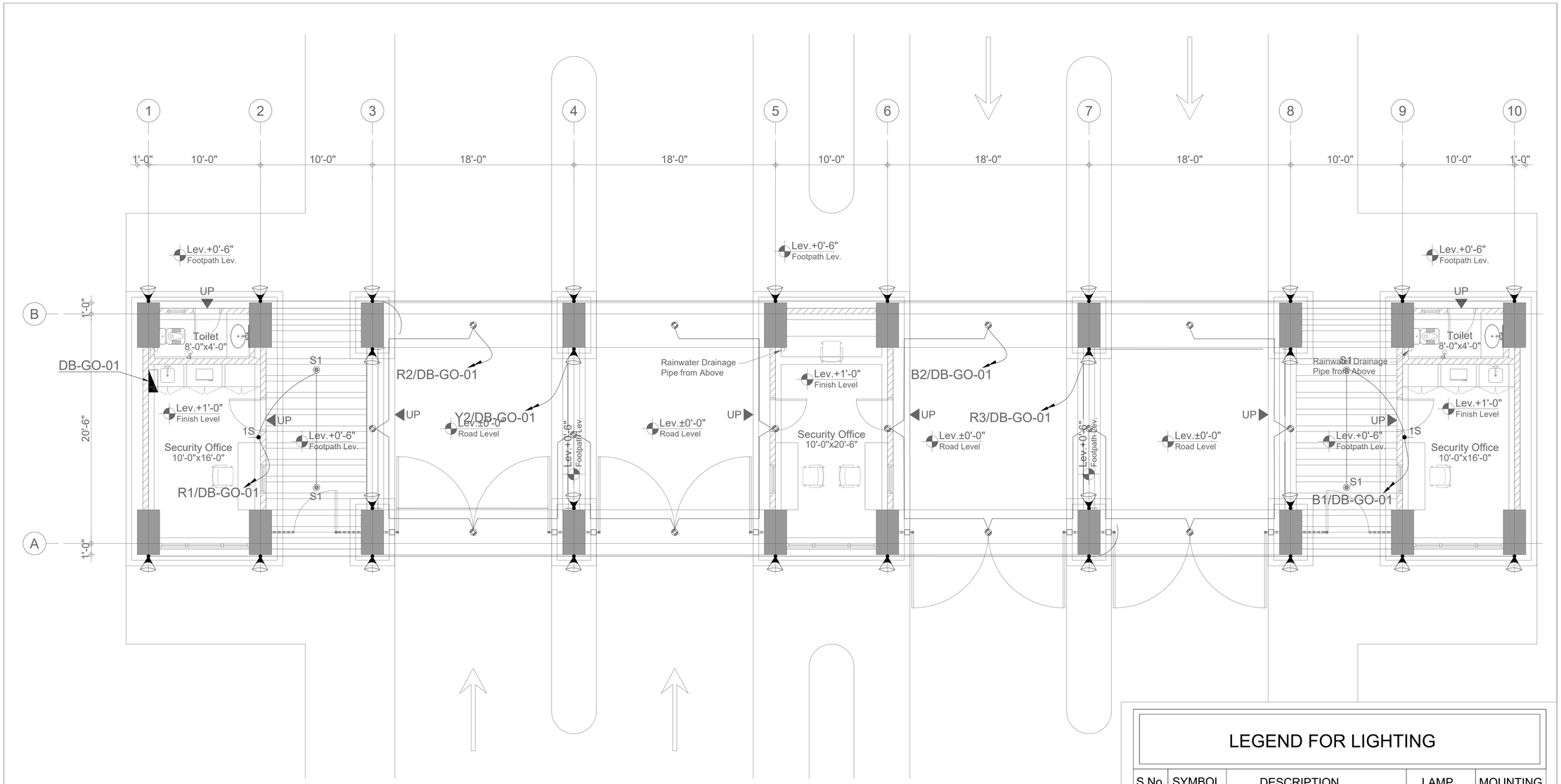
GATE OFFICE

Drawing Title :

TOP ROOF PLAN
LIGHTNING PROTECTION
SYSTEM LAYOUT

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
ZN	Aug, 2018	1/16"=1'-0" @A3 3/16"=1'-0" @A1
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-EP-0200



APPROACH ROAD

LEGEND FOR LIGHTING

S.No.	SYMBOL	DESCRIPTION	LAMP	MOUNTING
1	D1	DOWNLIGHT FIXTURE, METAL HOUSING WITH PC LIGHT DIFFUSER (IP-20)	1x18W LED	CEILING RECESSED
2	D2	DOWNLIGHT FIXTURE (IP-44)	1x12W LED	CEILING SURFACE
3	D3	DECORATIVE TYPE DOWNLIGHT FIXTURE WITH PMMA DIFFUSER (IP-20)	1x12W LED	CEILING SURFACE
4	D4	DOWNLIGHT FIXTURE, METAL HOUSING WITH PC LIGHT DIFFUSER (IP-20)	1x15W LED	CEILING SURFACE
5	FS1	FLOOD LIGHT, DIE CAST ALUMINUM WITH PC DIFFUSER (IP-66)	1x100W LED	WAL SURFACE
6	W1	WALL LIGHT WEATHER PROOF LIGHT FIXTURE DIE CAST ALUMINUM (IP-54)	1x12W LED	WALL / SURFACE
7	W2	WALL LIGHT WEATHER PROOF LIGHT FIXTURE BODY MADE OF POLYCARBONATE (IP-54)	1x15W LED	WALL / SURFACE
8		CEILING FAN	56"	CEILING SURFACE
9		EXHAUST FAN		WALL
10	NS / ND	LIGHTING CONTROL SWITCH (N GANG) / FAN DIMMER (N DIMMER)		WALL
11	ST1	STRIP LIGHT FIXTURE (IP-66)	12W PER METER	SURFACE

NOTES;-

1. ALL FINISHES OF LIGHT FIXTURES AND COLOUR TEMPERATURE OF LAMPS SHALL BE SUBJECT TO ARCHITECT'S APPROVAL .
2. FOR FINAL LOCATION OF DBs REFER TO POWER DRAWINGS.

Client :

Sindh Madressatul Islam University

Consultant :

EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :

Note:

- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267°-91' from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	September, 2020
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

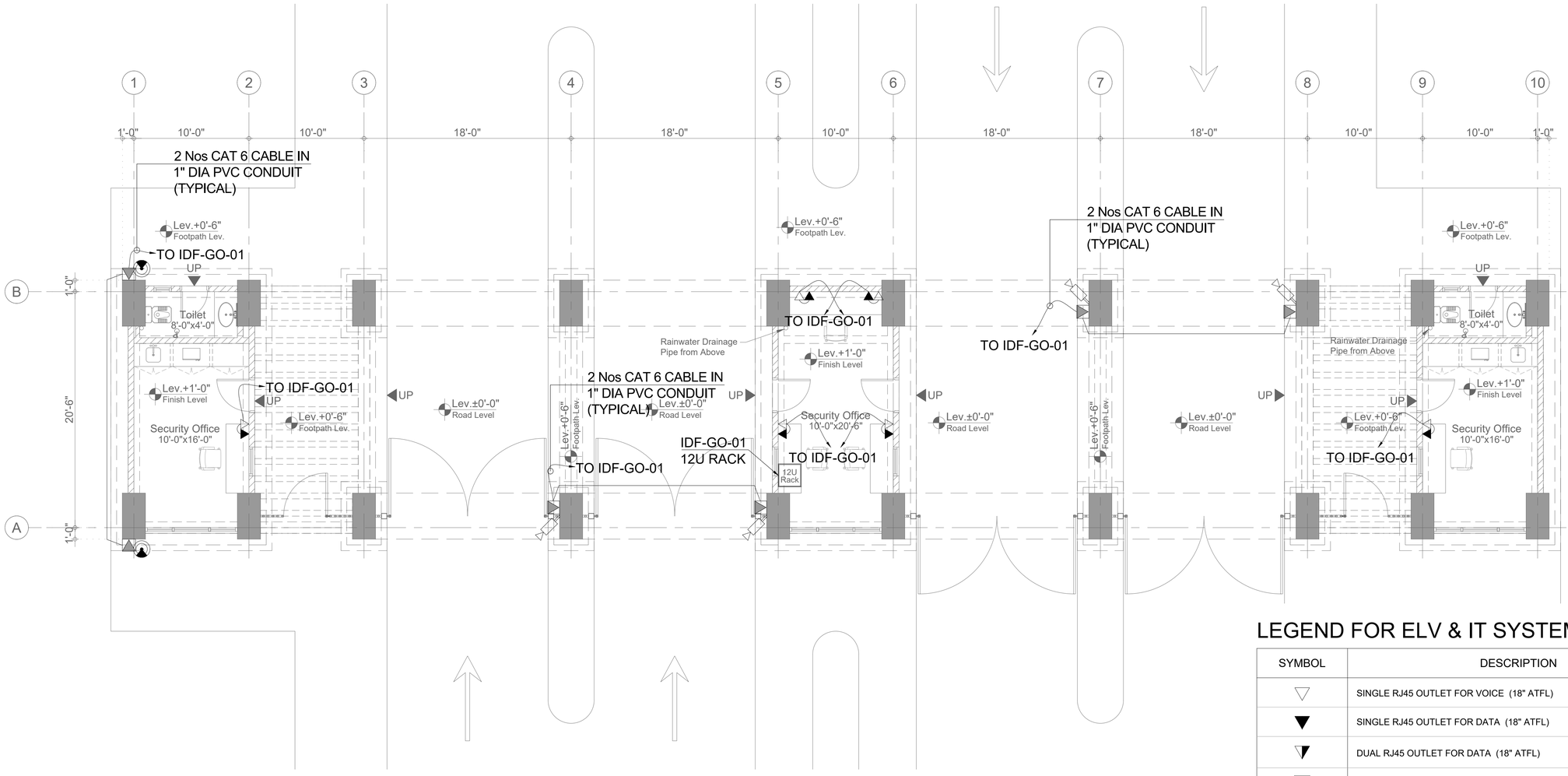
Building Name: GATE OFFICE

Drawing Title : EXTERNAL LIGHTINGLAYOUT

Designed :	Checked :	Approved :
SK	SK	JIS
Drawn :	Date :	Scale / Sheet :
MA	Aug, 2018	1/16"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. : EA-00986-SMGO-EX-0100

UNIVERSITY PREMISES



APPROACH ROAD

LEGEND FOR ELV & IT SYSTEM

SYMBOL	DESCRIPTION
▽	SINGLE RJ45 OUTLET FOR VOICE (18" ATFL)
▼	SINGLE RJ45 OUTLET FOR DATA (18" ATFL)
▽▼	DUAL RJ45 OUTLET FOR DATA (18" ATFL)
▽	SINGLE RJ45 OUTLET FOR CCTV DATA @CEILING / WALL
TV ▼	TELEVISION POINT @H/L
W ▽	SINGLE RJ45 DATA OUTLET FOR WIFI @CEILING / WALL
P ▽	SINGLE RJ45 DATA OUTLET FOR PROJECTOR ABOVE FALSE CEILING
⧓	**FLOOR DISTRIBUTION BOX:** **1 No 10A 2 PIN SWITCHED SOCKET OUTLET** **1 No 13A 3 PIN FLAT DUPLEX SWITCHED SOCKET OUTLET** **1 No DUAL RJ-45 OUTLET FOR VOICE & DATA**
12U	12U TELECOM RACK (WALL MOUNTED)
42U	42U TELECOM RACK (FLOOR STANDING)
◯	MANHOLE FOR TELECOM (2'-0"x2'-0")
▭◁	CCTV FIXED CAMERA TYPE (WALL MOUNTED)
◉	CCTV DOME CAMERA TYPE
ACS	ACCESS CONTROL SYSTEM PANEL(2 DOOR TYPE)
●	DOOR LOCK UNIT
PB	PUSH BUTTON
CR	PROXIMITY CARD READER
TJB	TELEPHONE JUNCTION BOX
▭	SPLITTER BOX

Client :

Sindh Madressatul Islam University

Consultant :

EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :

Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:

Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	December, 2018
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

Building Name:

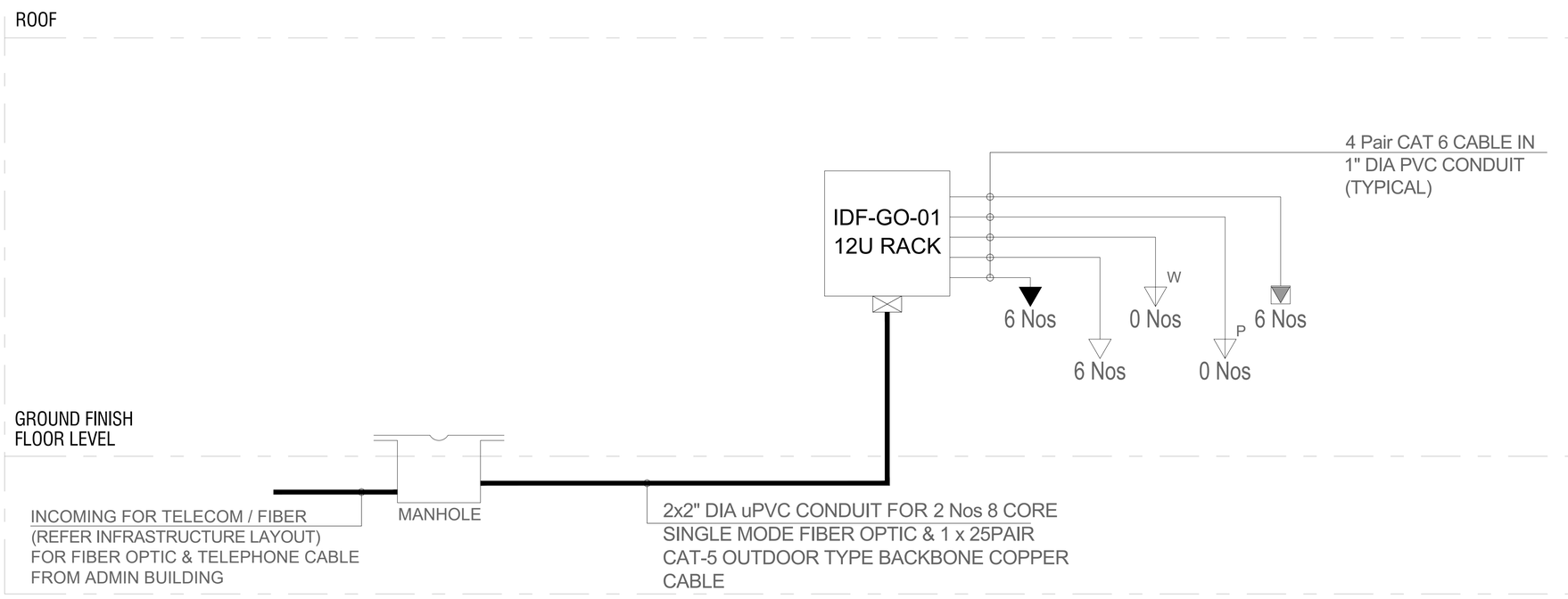
GATE OFFICE

Drawing Title :

GROUND FLOOR PLAN TELECOMMUNICATION & NETWORKING LAYOUT

Designed : AJ	Checked : AJ	Approved : JIS
Drawn : ZN	Date : Aug, 2018	Scale / Sheet : 1/16"=1'-0" @A3 3/16"=1'-0" @A1
Project Code : 00986		Rev. : 0
Drawing No. : EA-00986-SMGO- IT-0100		

TELECOMMUNICATION & NETWORKING SYSTEM SCHEMATIC DIAGRAM



IDF-MH-GF

12U RACK DETAIL
1 Nos LC 24 Port Fiber Patch Panel
1 Nos 24 Port CAT-6 UTP Patch Panel
2 Nos CABLE ORGANIZER
1 No 19" 1x50 PAIR IDC BLOCK
SPACE FOR ACTIVE EQUIPMENT

Client :

Sindh Madressatul Islam University

Consultant :

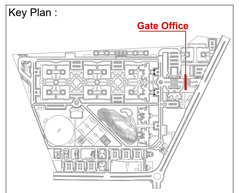
EA Consulting Pvt Ltd

Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7, Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Project :

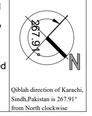
Development of Sindh Madressatul Islam University (SMIU) Campus At Education City,Malir, Karachi (PHASE I)

Key Plan :



Note:
- All Dimensions to be confirmed on site with architect.
- All Materials to be Approved by Architect.
- Only written dimensions to be followed.
- Any discrepancies to be clarified with the architect.
- For structure details refer, structure engineer drawings / details

North:



Qiblah direction of Karachi, Sindh,Pakistan is 267.91° from North clockwise

Rev. No.	DATE	DESCRIPTION
00	29-08-2024	Issued For Construction

REVISIONS

Date of Issue	December, 2018
Issued To	Client
Issued For	Construction

ELECTRICAL

Status: Construction

Building Name: GATE OFFICE

Drawing Title : TELECOMMUNICATION & NETWORKING SYSTEM SCHEMATIC DIAGRAM

Designed : AJ	Checked : AJ	Approved : JIS
Drawn : ZN	Date : Aug, 2018	Scale / Sheet : NTS @A3 NTS @A1
Project Code : 00986		Rev. : 0

Drawing No. : EA-00986-SMGO- IT-0200

GATE OFFICE PLUMBING

S.#	DRAWING NO.	DRAWING TITLE
	GENERAL DRAWING	
1	EA-00986-SMGO-P1-0001	LIST OF DRAWINGS
	DRAINAGE & WATER DRAWINGS	
1	EA-00986-SMGO-D1-0100	GROUND FLOOR PLAN
2	EA-00986-SMGO-W1-0200	GROUND FLOOR PLAN
	STANDARD DETAILS DRAWINGS	
1	EA-00986-SMGO-D1-0300	DRAINAGE STANDARD DETAILS
2	EA-00986-SMGO-W1-0400	WATER STANDARD DETAILS

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY ★ 1885 ★

Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :

No.	DATE	DESCRIPTION
0	24-09-02	Issued for Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

PLUMBING

Status: **TENDER**

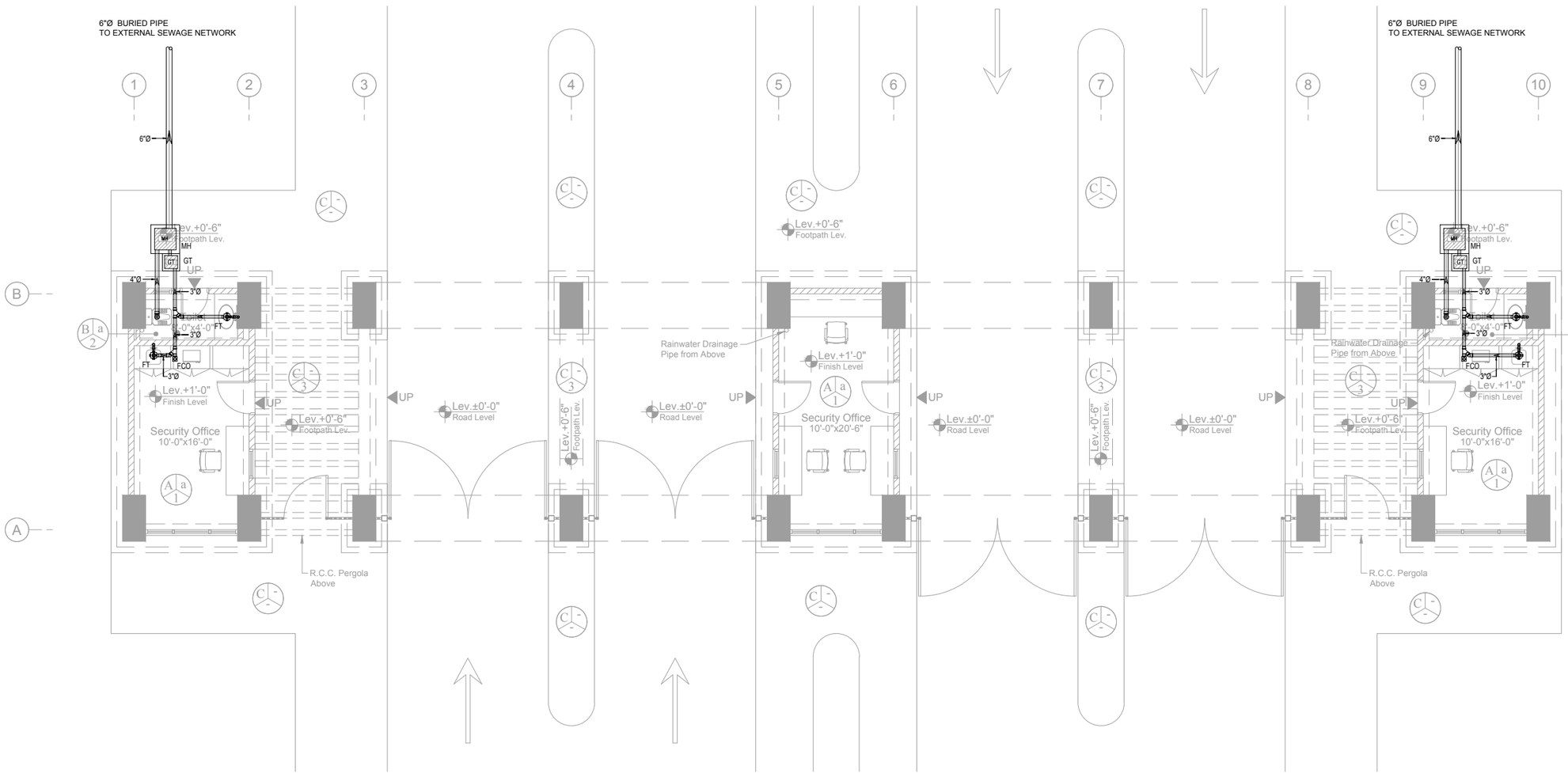
Building Name: **GATE OFFICE**

Drawing Title : LIST OF DRAWING

Designed :	Checked :	Approved :
MS	MT	ZA
Drawn :	**Date :**	**Scale / Sheet :**
MS	Sep, 2024	NTS@A3

Project Code : 00986 | Rev. : 0

Drawing No. : EA-00986-SMGO-P1-0001



Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTIRE TO LEARN
GO FORTH TO SERVE
1885

Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :

No.	DATE	DESCRIPTION
0	24-09-02	Issued for Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction at Karachi is 287.30000 Degrees From North Clockwise

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

PLUMBING

Status:
TENDER

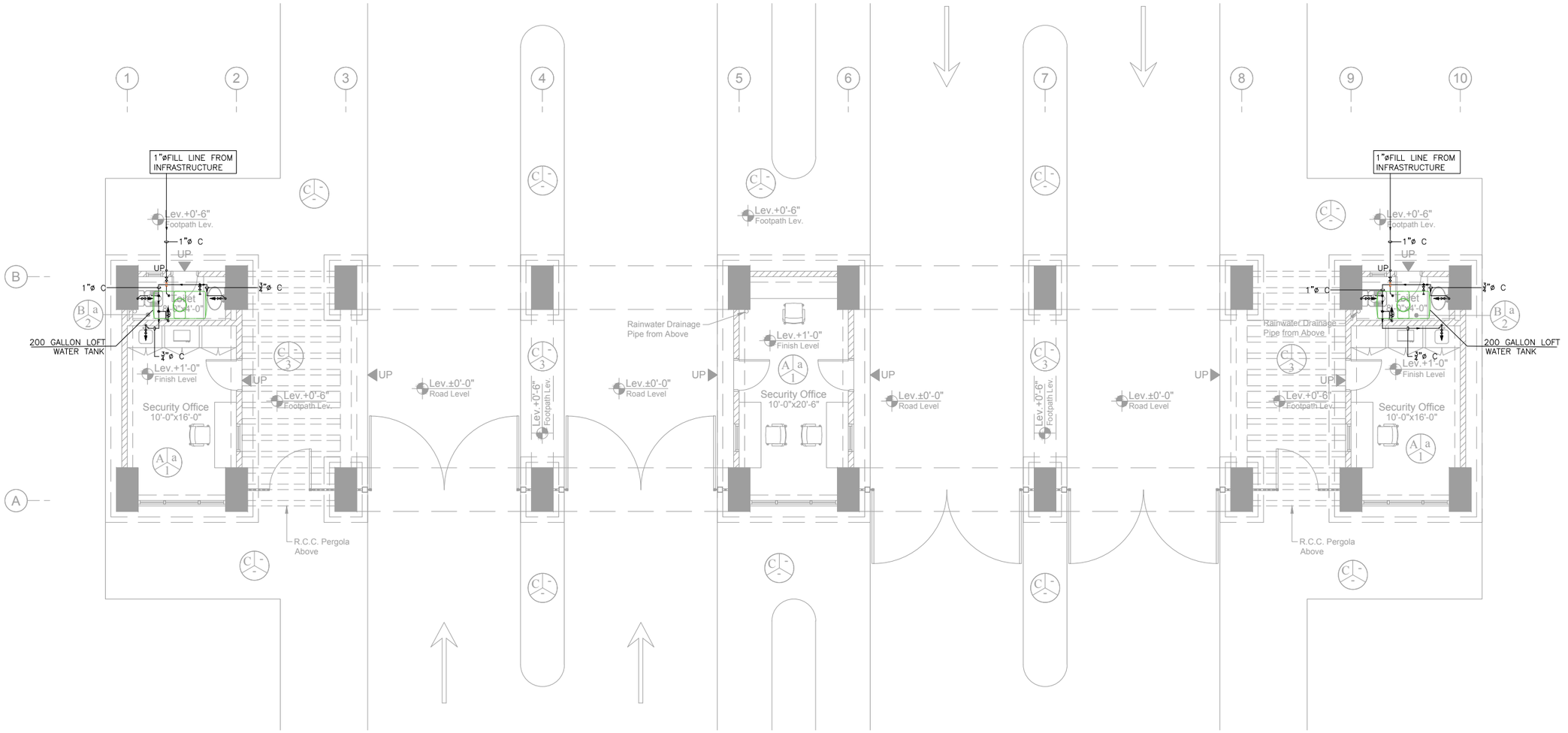
Building Name:
GATE OFFICE

Drawing Title :

GROUND FLOOR PLAN
DRAINAGE LAYOUT

Designed :	Checked :	Approved :
MS	MT	ZA
Drawn :	Date :	Scale / Sheet :
MS	Sep, 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-D1-0100



Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :

No.	DATE	DESCRIPTION
0	24-09-02	Issued for Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction at 287.50000° Degrees From North Clockwise

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

PLUMBING

Status:
TENDER

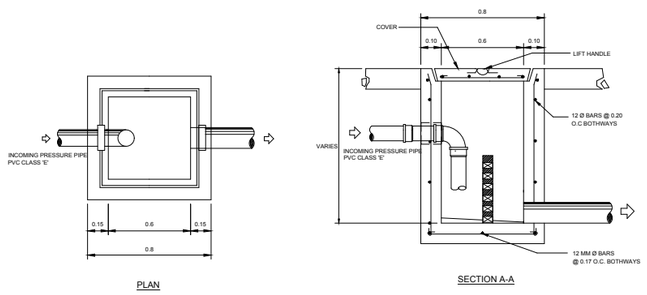
Building Name:
GATE OFFICE

Drawing Title :

GROUND FLOOR PLAN
WATER SUPPLY LAYOUT

Designed :	Checked :	Approved :
MS	MT	ZA
Drawn :	Date :	Scale / Sheet :
MS	Sep, 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

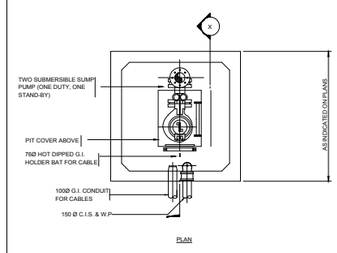
Drawing No. :
EA-00986-SMGO-W1-0100



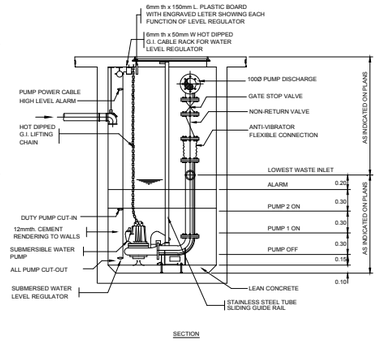
PLAN

SECTION A-A

01 **PRESSURE BREAKING MANHOLE**
NOT TO SCALE (NTS)

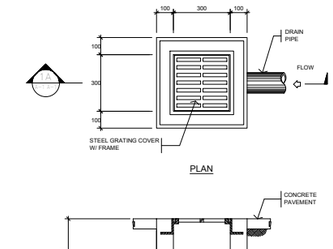


PLAN

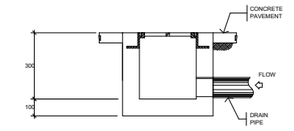


SECTION

02 **SEWAGE PIT WITH SUBMERSIBLE PUMPS**
NOT TO SCALE (NTS)

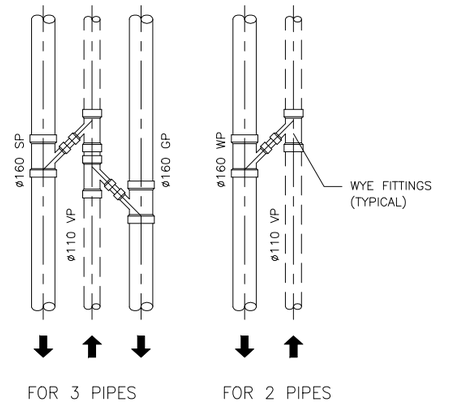


PLAN

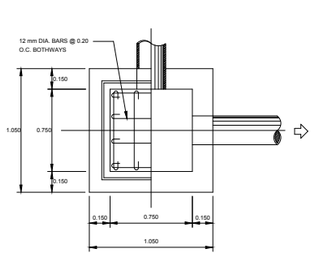


SECTION A-A

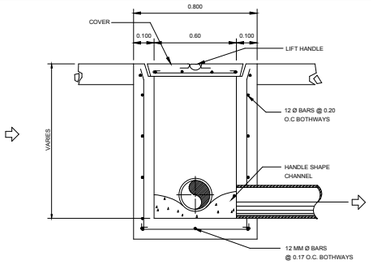
03 **CATCH BASIN INSTALLATION**
NOT TO SCALE (NTS)



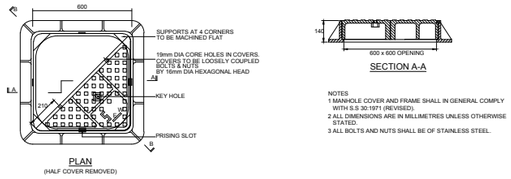
04 **CROSS VENTING DETAILS**
NOT TO SCALE (NTS)



PLAN



SECTION A-A

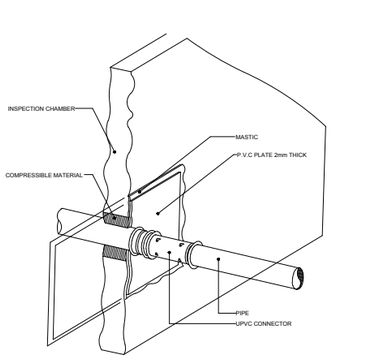


PLAN
(HALF COVER REMOVED)

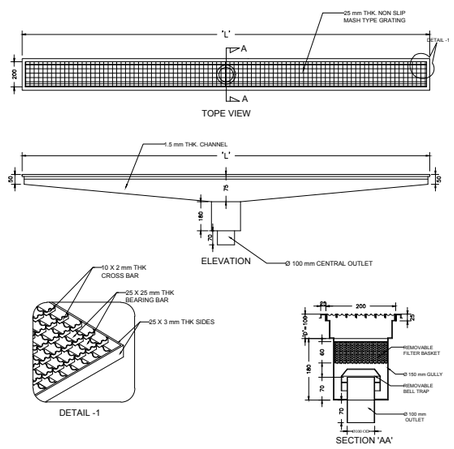
SECTION A-A

NOTES
1 MANHOLE COVER AND FRAME SHALL IN GENERAL COMPLY WITH S.S 30:1971 (REVISED).
2 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
3 ALL BOLTS AND NUTS SHALL BE OF STAINLESS STEEL.

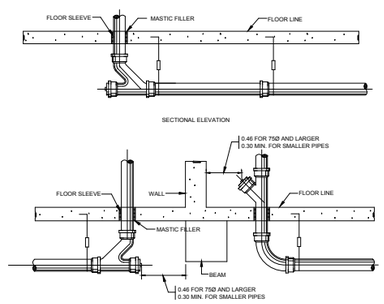
05 **SEWAGE MANHOLE**
NOT TO SCALE (NTS)



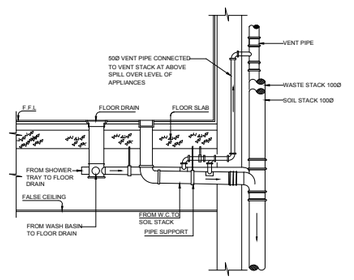
07 **PVC PIPE THROUGH UNDERGROUND STRUCTURE**
NOT TO SCALE (NTS)



07 **TYPICAL RAIN WATER OUTLET**
NOT TO SCALE (NTS)



08 **CEILING HUNG CLEANOUTS**
NOT TO SCALE (NTS)



09 **FLOOR DRAIN**
NOT TO SCALE (NTS)

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTIRE TO LEARN GO FORTH TO SERVE
1885

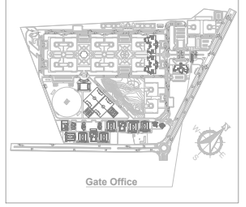
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	24-09-02	Issued for Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction of Karachi, South, Pakistan is 267.90506° Degrees From North Clockwise

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

PLUMBING

Status:
TENDER

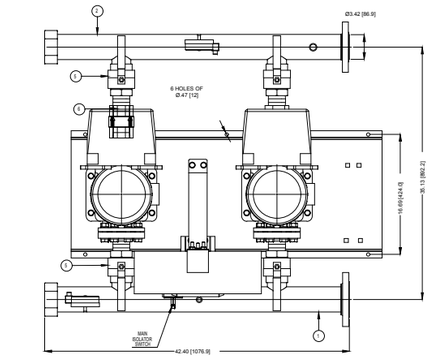
Building Name:
GATE OFFICE

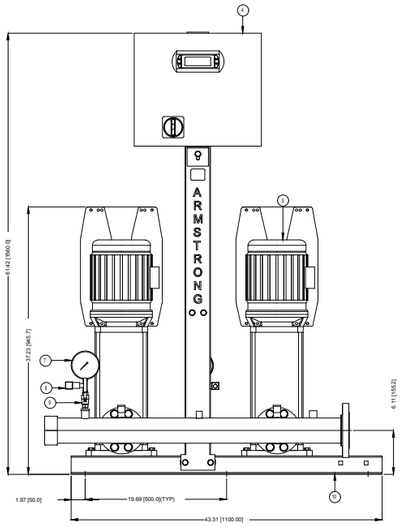
Drawing Title :

DRAINAGE STANDARD DETAILS

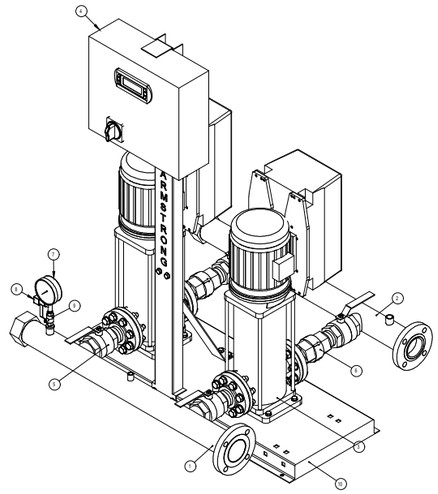
Designed :	Checked :	Approved :
MS	MT	ZA
Drawn :	Date :	Scale / Sheet :
MS	Sep, 2024	NTS@A3
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-D1-0300

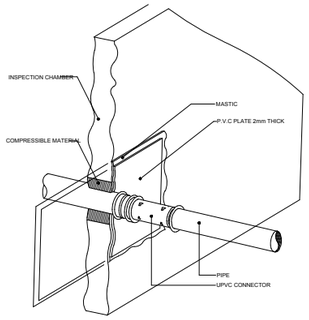




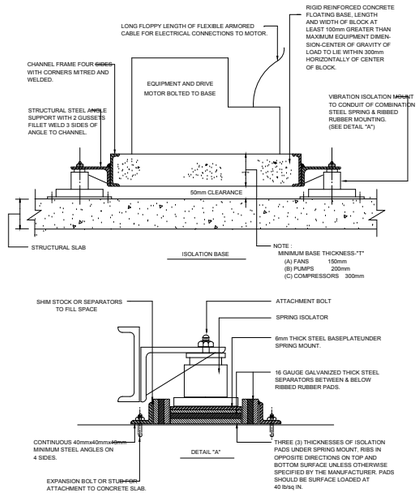
01 TRANSFER PUMP SET
NOT TO SCALE (NTS)



ITEM	DESCRIPTION	QTY.
10	Stainless Steel Base and Panel Support	1
9	Isolation Valve	2
8	Pressure Transducer	2
7	Pressure Gauge	2
6	Check Valve	2
5	Isolation Valve	4
4	Control Panel with PLC	1
3	Pump with Integrated VFD	2
2	Stainless Steel Discharge Header	1
1	Stainless Steel Suction Header	1



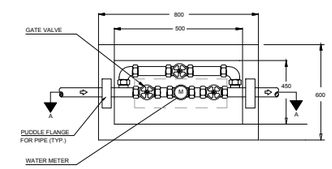
02 PVC PIPE THROUGH UNDERGROUND STRUCTURE
NOT TO SCALE (NTS)

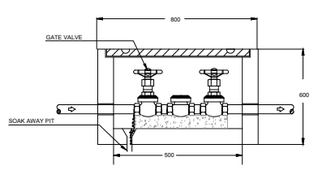


03 EQUIPMENT ISOLATION BASE DETAIL
NOT TO SCALE (NTS)

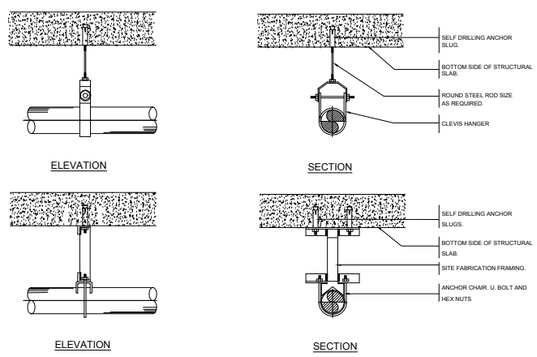
NOT USED

04





05 WATER METER PIT
NOT TO SCALE (NTS)



06 HANGERS FOR PLUMBING PIPES
NOT TO SCALE (NTS)

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTIRE TO LEARN GO FORTH TO SERVE
1885

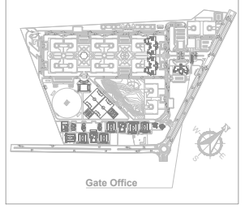
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	24-09-02	Issued for Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed. Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Qiblah direction at N 287.50000 Degree From North Clockwise

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

PLUMBING

Status:
TENDER

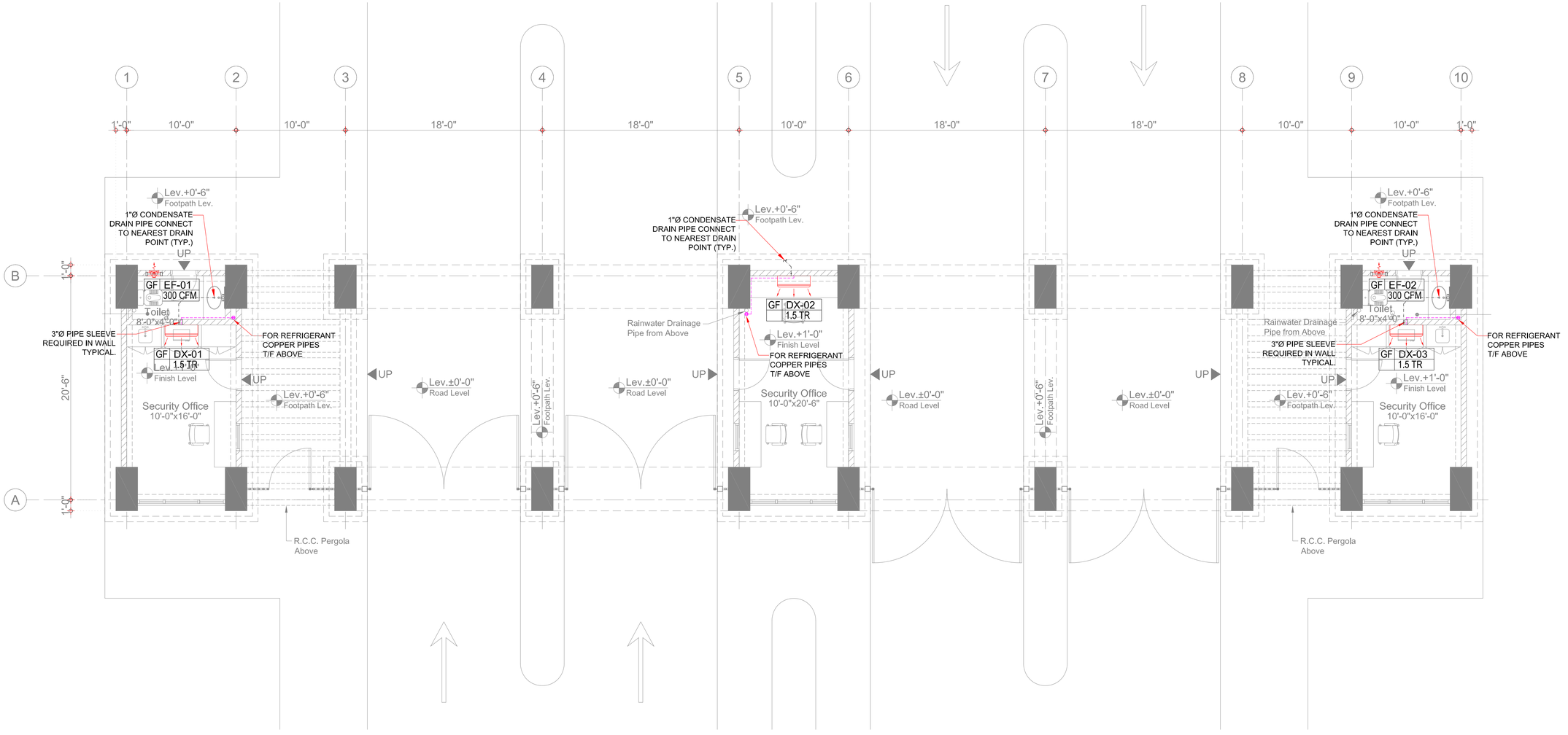
Building Name:
GATE OFFICE

Drawing Title :
WATER STANDARD DETAILS

Designed :	Checked :	Approved :
MS	MT	ZA
Drawn :	Date :	Scale / Sheet :
MS	Sep, 2024	NTS@A3
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-W1-0400

UNIVERSITY PREMISES



APPROACH ROAD

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

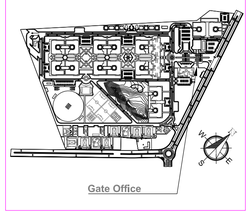
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
REVISIONS		

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed, Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	
Issued To	
Issued For	

HVAC

Status: **TENDER**

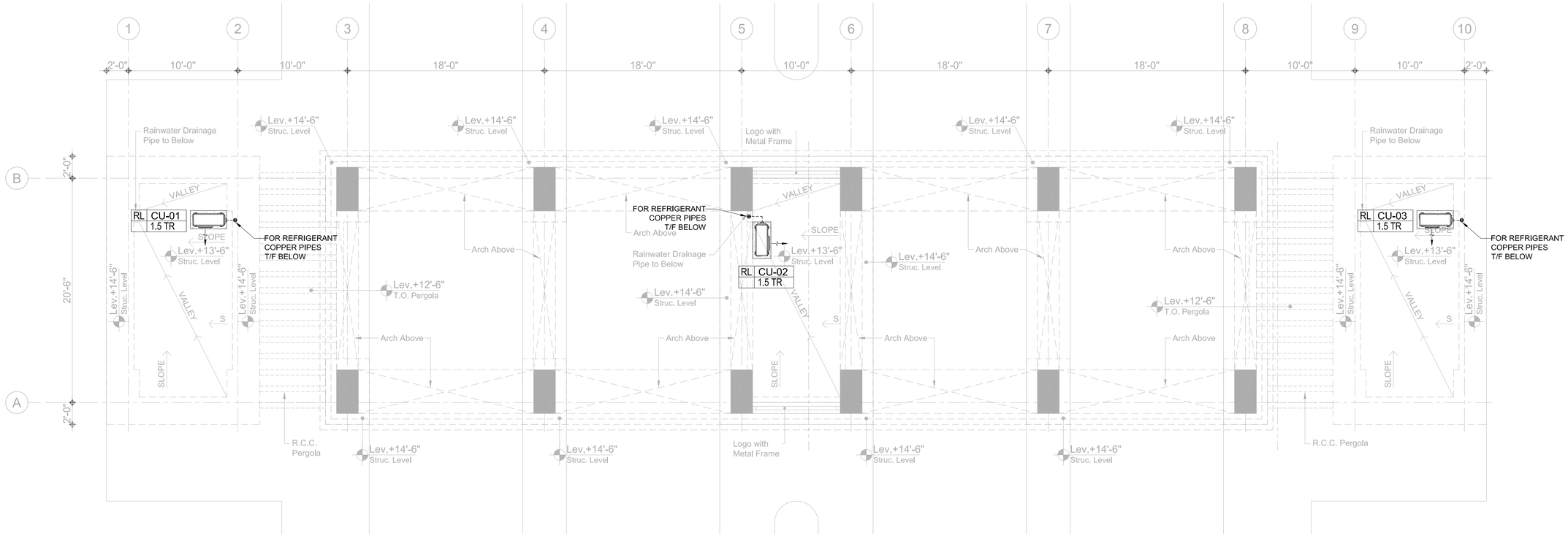
Building Name: **GATE OFFICE**

Drawing Title :

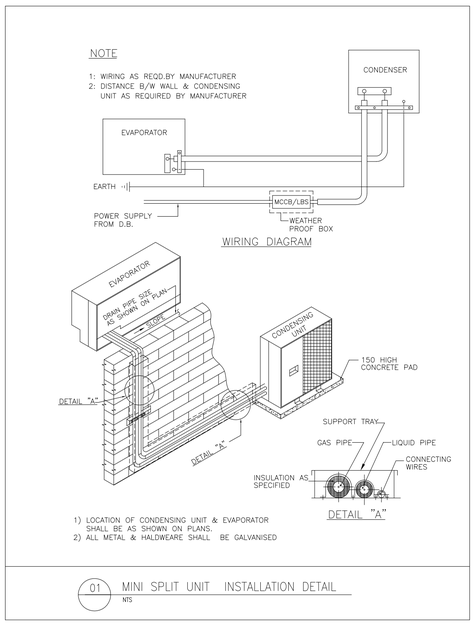
GROUND FLOOR PLAN
HVAC LAYOUT

Designed :	Checked :	Approved :
MI	MAJ	SZ
Drawn :	Date :	Scale / Sheet :
A.A	AUG, 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

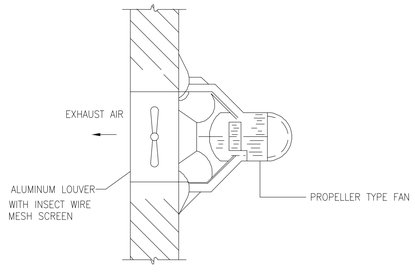
Drawing No. : EA-00986-SMGO-M1-0100



ROOF PLAN



01 MINI SPLIT UNIT INSTALLATION DETAIL
NTS



02 FIXING DETAIL OF PROPELLER FAN
NTS

DX- SPLIT TYPE AIRCONDITIONING UNITS SCHEDULE

TAG NO.	AREA SERVED	INDOOR UNITS LOCATION	OUTDOOR UNITS LOCATION	QUANTITY (Nos.)	COOLING CAPACITY	AMBIENT TEMP.	EAT ^{O}F	LAT ^{O}F	ELECTRICAL DATA				REMARKS
					TR	^{O}F	DB/WB	DB/WB	V	PH	HZ	KW	
DX-01 TO 03 / CU-01 TO 03	SECURITY OFFICES	GROUND FLOOR	ROOF	03	1.5	104	75 / 63	55 / 54	220	1	50	2.1	WALL MOUNTED DECORATIVE TYPE

HVAC FAN SCHEDULE

S.No	TAG	SERVICE	LOCATION	TYPE	QTY.	FAN DATA		MOTOR DATA			REMARKS
						FLOW (CFM)	ESP (Inch of W.G)	RPM	POWER (KW)	V-PH-HZ	
1	EF-01 TO 03	TOILET EXHAUST	GROUND FLOOR	PROPELLER	2	300	0.25	-	0.20	220-1-50	PLASTIC BODY FAN WITH LOUVER

Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

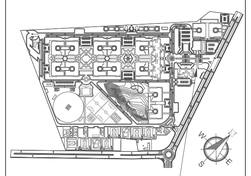
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed, Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

HVAC

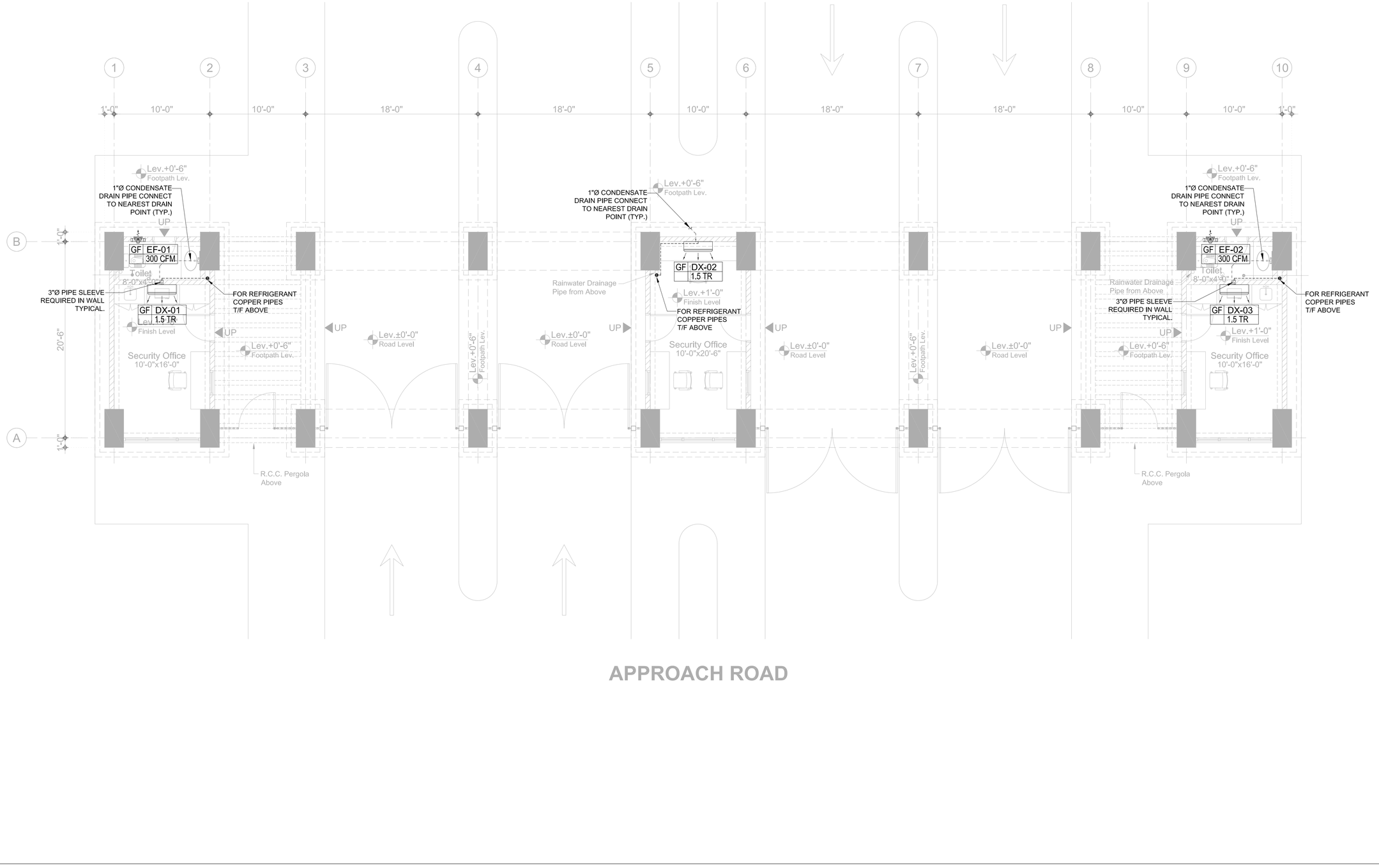
Status:
TENDER

Building Name:
GATE OFFICE

Drawing Title :
ROOF PLAN
HVAC LAYOUT

Designed : MI	Checked : MAJ	Approved : SZ
Drawn : A.A	Date : AUG. 2024	Scale / Sheet : 3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code : 00986		Rev. : 0

Drawing No. :
EA-00986-SMGO-M1-0200



Client :

SINDH MADRESSATUL ISLAM UNIVERSITY
ENTRE TO LEARN GO FORTH TO SERVE
1885

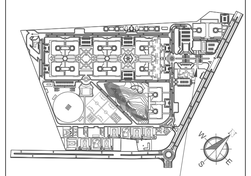
Consultant :

EA Consulting Pvt Ltd
AL-9,15th Lane,
Off Khayaban-e-Hilal,
DHA Phase 7,
Karachi, Pakistan 75500
PABX: +92-21-111-111-584,
Fax : +92-35841825
Email:www.eaworld.com

Project :

Development of Sindh Madressatul Islam University (SMIU) Campus At Education City, Malir Karachi (P H A S E - I)

Key Plan :



No.	DATE	DESCRIPTION
0	2024.09.02	Issued For Tender

REVISIONS

Note:
- All dimensions to be checked and verified on Site.
- Only written dimensions to be followed, Do not scale any drawing.
- All dimensions are in **feet / inch** unless otherwise specified.
- All Structural And MEP drawings to be read in conjunction with Architecture drawings.
- The Architect / Engineer shall be notified of any discrepancy immediately.

North:

Date of Issue	September, 2024
Issued To	Client
Issued For	Tender

HVAC

Status:
TENDER

Building Name:
GATE OFFICE

Drawing Title :

GROUND FLOOR PLAN
HVAC LAYOUT

Designed :	Checked :	Approved :
MI	MAJ	SZ
Drawn :	Date :	Scale / Sheet :
A.A	AUG. 2024	3/32"=1'-0"@A3 3/16"=1'-0"@A1
Project Code :		Rev. :
00986		0

Drawing No. :
EA-00986-SMGO-M1-0100