



Merit – Quality - Excellence
Sukkur IBA University



**Construction of Academic Block-II,
IBA Community College Jacobabad.
Tender # PROC/277**

Sukkur IBA University
Nisar Ahmed Siddiqui Road, Sukkur

Email: info@iba-suk.edu.pk

Web: www.iba-suk.edu.pk

Tel. No. 071-5630272, 5644100 -PD (Off) No. 071-5644025-26

1. Background

At Sukkur IBA University, Construction of Academic Block-II at IBA CC Jacobabad (detailed in BOQ) are required to be constructed. So, a tender is called for execution of said work

2. General Terms and Conditions

The following General Terms and Conditions apply,

- 2.1.** The last date of submission of Bids is **22nd February 2022 at 14:00 hours**
- 2.2.** Detail of manufacturing facilities
- 2.3.** Structure /Organizational Chart.
- 2.4.** An affidavit to the effect that the firm has not been blacked listed by any Government /semi government organization.
- 2.5.** Sukkur IBA or its representative shall have the right to inspect the material at site, check its quality reports and confirm their conformity to the contract specification.
- 2.6.** The Bidder shall provide following information with respect to its Company Profile.
 - 2.6.1.** Registered Name of the Organization.
 - 2.6.2.** National Tax Number, Sindh Sales Tax Number.
 - 2.6.3.** Head Office address.
 - 2.6.4.** Management structure & organization Chart.
 - 2.6.5.** Name, Address with Telephone/ Telex and Fax numbers of the contract person.
- 2.7.** Financial status of the Bidders Organization with supporting documents and last two years annual reports.
- 2.8.** Provide a certificate from your bank certifying your sound financial position and credit limits from the bank.
- 2.9.** List of clients and their acceptance of deliverables, showing separately the items provided and value thereof.
- 2.10.** Company incorporation Certificate and Company Profile.
- 2.11.** The Bidder shall furnish a comprehensive list of reference sites where the likewise tender work has completed already.

2.12. Sukkur IBA, reserves the right to reject any or all Bids/ Offers without assigning any reason or cancel the process at any time.

2.13. Sukkur IBA reserves the right to increase/ decrease the quantity of items / scope of the work. Bidder has no right to challenge the decision.

3. Proposal Submission Requirements

- 3.1. For this tender PPRA's **Single stag-two envelope Procedure** as per clause 36 (b) for open competitive bidding is adopted. The bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal;
- 3.1.1 The envelopes shall be marked as **"FINANCIAL PROPOSAL"** and **"TECHNICAL PROPOSAL"** in bold and legible letters to avoid confusion;
- 3.1.2 Initially, only the envelope marked **"TECHNICAL PROPOSAL"** shall be opened;
- 3.1.3 The envelope marked as **"FINANCIAL PROPOSAL"** shall be retained in the custody of the procuring agency without being opened;
- 3.1.4 The procuring agency shall evaluate the technical proposal, without reference to the price and reject any proposal which do not conform to the specified requirements;
- 3.1.5 During the technical evaluation no amendments in the technical proposal shall be permitted;
- 3.1.6 The financial proposals of bids shall be opened publicly at a time, date and venue announced after technical assessment and evaluation.
- 3.1.7 After the evaluation and approval of the technical proposal the procuring agency, publicly open the financial proposals of the technically accepted bids only. The financial proposal of bids found technically non-responsive shall be returned un-opened to the respective bidders.

3.2. Technical Proposal

3.2.1. Technical proposal must include the complete solution proposed by the Bidder

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

3.2.3 Technical proposal comprises of manufacturing process, from cutting to molding, assembling and finishing detailing all the equipments to be used for the manufacture of items.

3.2.4 Description of material.

3.2.5. Completion schedule on Bar chart, Primavera or other software.

3.2.6 Technical proposal shall provide the details of company, complete factory details etc.

3.2.7. Financial Proposal of only those Bidders will be considered who's Technical Proposal qualify.

3.2.8. Bidders must possess the valid **PEC license (Category C-3)**, if not than his financial proposal will be rejected.

SUKKUR IBA UNIVERSITY				
Technical Evaluation Criteria				
Contractor's Name:				
S. No	Description	Max: Marks	Marks Obtained	Remarks
1	Name & Address of Firm / Company (along with organizational Structure)	10		
2	Status/ Standing of Firm (PEC- Cat)	10		
3	Name of Principal Personnel (their qualification and Experience)	5		
4	List of Technical Staff (their qualification and experience)	10		
5	List of Machinery and Equipment owned	10		
6	List of Works for Similar Nature (completed during last 5 years)	10		
7	List of Works for Similar Nature (works in Hand)	10		
8	Bank Statement & Banker's Certificate (showing credit worthiness of the Firm/ Co)	5		
9	Satisfactory Reports/ certificates from Organizations/ departments (works done earlier)	5		
10	Registration certificates (FBR / SRB)	10		
10	Income Tax Return of last 3 years	5		
11	Registration with Other Organizations/ departments.	10		
	Total Marks	100		

3.3. Financial Proposal

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

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

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

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

3.3. 4. The Bidder shall furnish s earnest money equivalent to 2% of the total value of bid in the form of Bank Draft issued by a scheduled bank of Pakistan in favor of “**Sukkur IBA University**” along with financial proposal .**No Bid shall be entertained without earnest money**. Earnest money of the successful bidder will be released after defect liability & maintenance period.

4. Terms of Payment

Payment of contract price shall be made in the following manner:

4.1 Running payments will be made to contractor after satisfaction of quality, quantity as per the terms conditions and specification of the contact, than final payment will be made.

**CONSTRUCTION OF ACADEMIC BLOCK-II,
IBA COMMUNITY COLLEGE, JACOBABAD**

**TENDER DOCUMENTS FOR
CIVIL & PLUMBING WORK**

**Volume I
Conditions of Contract**

**Habib Fida Ali
Architects**
4, Ch. Khaliqzaman Road,
Karachi – 75530
Tel: 92-21-566 1720, 566 1684
Fax: 92-21-568 6891
Email: info@habibfidaali.com
www.habibfidaali.com

**CONSTRUCTION OF ACADEMIC BLOCK-II,
IBA COMMUNITY COLLEGE, JACOBABAD.**

**TENDER DOCUMENTS FOR
CIVIL & PLUMBING WORK**

**Volume II
Specifications**

**Habib Fida Ali
Architects**

4, Ch. Khaliqzaman Road,
Karachi – 75530

Tel: 92-21-566 1720, 566 1684

Fax: 92-21-568 6891

Email: info@habibfidaali.com

www.habibfidaali.com

**CONSTRUCTION OF ACADEMIC BLOCK-II,
IBA COMMUNITY COLLEGE, JACOBABAD.**

**ENGINEER'S ESTIMATES FOR
CIVIL, ELECTRICAL & PLUMBING WORK**

**Volume – III
Bill of Quantities**

**Habib Fida Ali
Architects**

4, Ch. Khaliqzaman Road,
Karachi – 75530

Tel: 92-21-566 1720, 566 1684

Fax: 92-21-568 6891

Email: info@habibfidaali.com

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1. Form of Tender

2. Instructions to Tenderer

3. Conditions of Contract

3.a. Special Conditions of Contract

AGREEMENT

MOBILIZATION ADVANCE

BID BOND

PERFORMANCE BOND

Bill of Quantities

Specification for Civil Work

Specification for Plumbing Work

Bill of Quantities for Civil Work

Bill of Quantities for Electrical Work

Bill of Quantities for Plumbing Work

1. FORM OF TENDER
pages 1-1 to 1- 5

Engr. Ubedullah Soomro
Project Director
Sukkur IBA University
Nisar Ahmed Siddiqui Road
Sukkur-65200

**CONSTRUCTION OF
IBA COMMUNITY COLLEGE, JACOBABAD**

Dear Sir,

- 1.1** Having inspected the SITE and checked all local conditions affecting the WORK, and having also examined all Tender Documents including the Drawings, Instructions for Tenderers, Conditions of CONTRACT, Special Conditions of CONTRACT, Specifications, Bill of Quantities, for the above named WORK, we the undersigned offer to supply, install, execute and maintain the whole of the said WORK, in conformity with the said Tender Documents, for the price as mentioned below:

PILE WORK Rs. _____

CIVIL WORK Rs. _____

ELECTRICAL WORK Rs. _____

PLUMBING WORK Rs. _____

(in words) **Rupees** _____ **Only)**

as agreed upon under the CONTRACT or such other sums as may be

ascertained in accordance with the said CONDITIONS of CONTRACT.

- 1.2 We accept the above-mentioned Tender Documents as valid and binding including parts not countersigned in full by us. This also includes all Appendices to the Form of Tender attached hereto.
- 1.3 We confirm that we have satisfied ourselves about the SITE, services, round water, sub-soil, climatic, traffic and all other conditions in Pakistan in general and the SITE of the PROJECT, and related works in particular, which influence, or may influence the work, and that we do not require any further clarification and additional information thereto, and that we cannot raise any claim for not knowing them. The CONTRACTOR may see for his reference the sub-soil report of soil exploration work done by a soil investigation firm, which is available with the ARCHITECT and/or OWNER. The CONTRACTOR shall however make his own assessment by making further investigations. No claim will be entertained by the OWNER for dewatering and soil investigation, in case any variation or omission is found in such data.
- 1.4 We undertake to carry out such alterations, additions or curtailments of the WORK as may from time to time be determined and ordered in writing, in accordance with the CONTRACT, and at the rates in the Bill of Quantities.
- 1.5 The rates and prices which we have entered in the Bill of Quantities and Schedule, and all information and data attached with our Tender are complete and without any hidden or technical and/or financial reservations or implications. They have been duly checked, and are correct in every aspect.
- 1.6 The rates and prices which we have entered in the Bill of Quantities and Schedule, are firm and shall remain fixed for the entire duration of the CONTRACT, and are inclusive of custom duties, sales tax, local and federal taxes, Iqra surcharge, insurance, port and octroi charges, royalties, except change in direct taxes.
- 1.7 We attached herewith a **Bid Bond** for 2% of Contract Value in favor of the OWNER, in the form of Pay Order from a Scheduled Bank. We agree that should we withdraw the offer within the aforesaid period, and/or fail to sign the formal Agreement of CONTRACT, and/or fail to submit the Performance Bond; the OWNER shall be at liberty to appropriate at his absolute discretion such aforesaid Bid Bond.

- 1.8** A certificate attesting the signatures of our authorized representatives is enclosed.
- 1.9** We undertake, if our Tender is accepted, to commence the WORK at SITE within **7 (Seven) Calendar days** of the date of issue by the OWNER of the Letter of Award, and to sign the Agreement for the CONTRACT within **30 (Thirty) Calendar days** of the date of issue by the OWNER of the Letter of Award, and to complete the supply, installation and execution of the whole of the said WORK, in conformity with the said Tender Documents, within **18 (Eighteen) calendar months** of the date of issue by the OWNER of the Letter of Award, or such extended time as may be allowed by the OWNER from time to time under the CONTRACT.
- 1.10** If our Tender is accepted, we shall furnish a **Performance Bond** as per the format as in Appendix II to these CONDITIONS of CONTRACT, from a Scheduled Bank or which shall be valid from the date of issue by the OWNER of the Letter of Award, till the expiry of the PERIOD of MAINTENANCE in accordance with Clause **3.17.4** of these CONDITIONS of CONTRACT.
- 1.11** We agree to pay all costs towards the preparation of the Agreement for the CONTRACT.
- 1.12** We further agree to abide by this Tender for a period of **90 (Ninety) Calendar days** from the date of opening of this Tender, and we agree to be bound by this Tender for that period.
- 1.13** Until and unless the Agreement is signed, this Tender and the OWNER's written acceptance thereof shall constitute a binding CONTRACT between us.
- 1.14** We understand that the OWNER is not bound to accept the lowest or any Tender he may receive.

Dated this ____ day of _____, 2021.

Name (in block letters) _____ Signature

Designation _____

Address _____ Seal of the Tenderer

Duly authorized to sign the Tender on behalf of:

_____ (Name of the Tenderer in Block Letters)

Address _____

Witness

Name (in block letters) _____

Designation _____

Address _____

2. INSTRUCTIONS TO TENDERERS

pages 2-1 to 2-8

2.1 Definitions and Interpretations:

In the CONTRACT (see the following for definition of the term "CONTRACT") the following words and expressions shall have the meaning hereby assigned to them except where the context otherwise requires:

2.1.1 **"GOVERNMENT"** means the Government of Sindh.

2.1.2 **"OWNER"** means
Sukkur IBA University
Nisar Ahmed Siddiqui Road, Sukkur

2.1.3 **"ARCHITECT"** means
Habib Fida Ali,
Chartered Architect,
4-Choudhry Khaliqzaman Road,
Karachi-75530.
and/or any person duly authorized by him.

2.1.4 **"CONTRACTOR"** means the firm or company, group of companies, who's Tender has been accepted by the OWNER. The term CONTRACTOR, includes sponsor/representative of the company, firm/consortium their successors and his approved authorized representatives.

2.1.5 **"WORK"** means all supplies and performances, which are to be executed by the CONTRACTOR in accordance with the CONTRACT. Insofar as to be understood from the wording of the text, WORK also means the entirety of all or individual components which are to be completed and maintained until finally accepted within the scope of CONTRACT.

2.1.6 **"CONTRACT"** means the contractual agreement between the OWNER and CONTRACTOR for the execution of the WORK and includes the following documents:

- .1 The Agreement of CONTRACT;
- .2 The Form of Tender and its Appendices, filled in and signed by the CONTRACTOR;
- .3 The Instructions to Tenderer;
- .4 The Conditions of CONTRACT and Appendices to the Conditions of Contract;
- .5 The Specifications;
- .6 The Bill of Quantities priced by the CONTRACTOR;
- .7 The Tender Drawings;
- .8 The correspondence of the ARCHITECT and/or before finalization of the Tender;

- .9 The Special Correspondence with the CONTRACTOR, inclusive of the covering letter with the Tender;
 - .10 The Final Drawings of the ARCHITECT and/or issued for construction;
 - .11 The Shop Drawings prepared by the CONTRACTOR and approved for construction by the ARCHITECT and/or
 - .12 The as built drawings prepared by the CONTRACTOR and approved by the ARCHITECT and/or
 - .13 The Addendum/Corrigendum, related correspondence.
- 2.1.7 "CONTRACT PRICE"** means the price as in the Tender, inclusive of all additions or deletions foreseen in the CONTRACT, but without Liquidated Damages.
- 2.1.8 "CONSTRUCTION PLANT"** means all tools, machinery, equipment appliances or things of whatsoever nature, required for the execution, completion or maintenance of the WORK or Temporary WORKs (as hereinafter defined), but does not include materials or other things intended to form or forming part of the permanent structures.
- 2.1.9 "TEMPORARY WORKS"** means all temporary works of every kind, inclusive of the materials therefore, required in or about the execution, completion and maintenance of WORK until final acceptance. It also includes any material becoming part of the completed WORK, and any performances therewith, required and used only due to, or in consequence of, the construction methods, construction stages etc.
- 2.1.10 "DRAWINGS"** - The term "Drawings" wherever referred to in CONTRACT shall include in addition to those listed in the CONTRACT such additional scale and full size detail drawings as will be furnished by the ARCHITECT and/or from time to time as WORK progresses to amplify drawings listed.
- 2.1.11 "BILL OF QUANTITIES"** - The term Bill of Quantities shall mean that part of the CONTRACT documents under Section 5 outlining the quantities of the various items of WORK to be performed under the various sections of the Specifications, and the respective per unit prices for these items of work, quoted for by the Tendered.
- 2.1.12 "APPROVAL"** - The term "Approval" or "approved" shall be interpreted to mean "written approval".
- 2.1.13 "EQUAL", "EQUIVALENT", "SATISFACTORY"**, etc. When the terms "or equal", "approved", "acceptable", "satisfactory", "proper" or other general qualifying terms are used in CONTRACT, it shall be understood that reference is made to ruling and judgment of ARCHITECT and/or The term "equivalent" where used in this Specifications, in general

sense shall not mean "similar", but on the contrary, "conforming to, of like kind, quality and function". Proprietary items and trade names are used for the purpose of establishing a standard of "kind, quality and function", and "equivalent" items, articles, things or materials will be approved, if held to be "equivalent" by ARCHITECT.

"SITE" - The **"SITE"** shall mean the **IBA Community College, Jacobabad**, where the WORK is to be executed.

"SITE" also means land on, under, in or through which the WORK are to be executed or carried out, as well as all land or buildings provided by the OWNER for the purpose of the CONTRACT, and furthermore, all terrain as may be expressly designated in the CONTRACT as forming part of the SITE.

2.1.15 "Rupees" means Pakistani currency Rupees. It is the currency basis of the CONTRACT.

2.1.16 "MONTH" means thirty (30) calendar days.

2.1.17 "DAY" means calendar day.

2.1.18 Words used only in the singular, also include the plural, and vice versa where required by context.

2.2 General:

Only Contractors pre-qualified for the work are allowed to submit a Tender.

2.3 Confidentiality:

The Tenderer, whether or not he submits a Tender shall treat the details of the Documents as strictly confidential.

2.4 Tender in Accordance with Documents:

The Tender shall be made in accordance with the Tender Documents and the requirements stipulated therein. Any proposed alternate or alternatives for the execution of work will be considered only if it meets the minimum stated requirements for, and is at least equivalent to, its counterpart shown on Drawings and/or Specifications. All costs for the preparation and submitting of the proposed alternates and/or alternatives will be borne by the Tenderer and the Tenderer will not be reimbursed for anything connected with alternate and its submittal.

2.5 List of Tender Documents:

Each Tenderer shall receive **1 (one)** complete set of the Tender Documents, as in Clause 2.1.13 herein.

2.6 Accuracy of Tender Documents:

The Tenderers should carefully examine the Conditions of CONTRACT, the Specifications, the individual Bill of Quantities and the

Drawings and all relevant parts of the Tender Documents. The OWNER does not guarantee the accuracy of the Tender Documents or any part of them or any statement made or information given therein, or of the estimated quantities given in the Bill of Quantities, or of any other information supplied by or on behalf of the OWNER in respect of the Work.

2.7 Inspection of SITE:

The Tenderer should visit and inspect the SITE on his own responsibility and at his own expenses, to obtain all the information which may be necessary for the purpose of anticipating all conditions that may prevail during the course of construction. The Tenderer must satisfy himself as to the nature and extent of existing structure, facilities and other operations in the vicinity of the proposed Work, the nature of the existing roads or other means of transportation, the access to, and the egress from, the SITE and the Work. The OWNER shall not entertain any representations or claims at any time which result out of the Tenderer's not having information which could have been obtained prior to submittal of his Tender.

2.8 Utilities at SITE:

The Tenderer must enquire and satisfy himself as to the sources of supply, the sufficiency of the means of obtaining and transporting at his cost all plant, materials, labour, etc., and other things, required for or in connection with the Work. He must consider all other matters and possible contingencies affecting the execution, completion and maintenance of the Work.

2.9 Materials, Plants and Equipment:

The Tenderer will be deemed to have obtained full information about the availability and procurement of the required construction material, plant, equipment and tools and to have allowed in his Tender for all delays, additional costs and financing charges that may arise directly or indirectly there from.

2.10 Neglect to obtain information:

Any neglect or failure on the part of the Tenderer to obtain reliable information on the spot or elsewhere upon the foregoing or any other matters affecting the execution, completion and maintenance of the Work, the rates, total amounts and the CONTRACT shall not relieve the Tenderer whose Tender is accepted, from any risks or liabilities or from the responsibility of completing, handing over and maintaining the Work, including during the Period of Maintenance, all as defined in the CONTRACT.

2.11 Clarification and Queries:

If the Tenderer wishes to seek clarification of meaning of any Specifications, Drawings, or other data, he may, at the same time address his enquiry in writing to the ARCHITECT and/or such questions shall be received on the date announced for this purpose. All explanations and amendments respectively, given by the

ARCHITECT and/or shall be sent at the same time to all Firms invited to submit tender.

- .1 The tenderer shall in writing brought to the notice of the ARCHITECT/ CONSULTANT any item(s) of work shown in the drawings/ specifications but NOT INCLUDED in the B.O.Q. Items such as drip course, rounding corners, chamfer, making holes/ grooves for piping/ clamps, etc. if not shown in BOQ shall not be considered for payment.

2.12 Difficult Design or Specifications

If, in CONTRACTOR's opinion, any WORK is shown on Drawings or called for in Specifications in such a manner as to make it impossible for him to produce a first-class piece of WORK, he shall refer such facts in writing to ARCHITECT so that they may issue revisions/modifications, as he considers necessary.

2.13 Fullness of Rates:

The rates and prices set down by the Tenderer against all the items in the Bill of Quantities are to be the full inclusive value of the finished work described there under and shall cover profit and all obligations of every kind whatsoever which under the CONTRACT are to be borne by the CONTRACTOR.

2.14 Form of Entry into Tender Documents:

Tenders must be prepared only on the Documents supplied herewith.

2.14.1 Language

All entries are to be made in English and clearly in ink.

2.14.2 Tenderer's Name, Signatures and Stamps

All covers of the bound Tender Documents shall be marked with Tenderer's name and signed, with full signature of the authorized person(s). All pages and Drawings of the Tender Documents as well as erasures and/or corrections, if any, are to be initialized by the same representative(s). The Tenderer or his authorized representatives shall sign in full, stamp and date each page of the Tender Documents and in the spaces for the purpose, as well as all separate documents and drawings which shall be in English and form as supplement to Tender.

2.15 Alterations or Comments:

No alteration unless authorized in writing by ARCHITECT may be made in any of the Tender Documents. Any technical or other comments which are desired to be made, shall not be placed on any of the Tender Documents, but shall take the Form of a separate statement, as brief as possible and referenced to items, Clauses and pages of the Tender Documents.

2.16 Completeness of Tender:

Tenders must be complete, in all respects, including but not limited of the following:

2.16.1 The Bill of Quantities must be fully priced in all items, and totaled as required.

2.16.2 All Schedules and Appendices of the Tender Documents must be properly filled in, completed and signed as required.

2.16.3 All drawings, descriptions, time schedules and data to be supplied additionally by the Tenderer must be in English.

2.17 Additional Submissions:

The Tenderers must supply with their Tenders:

2.17.1 Contractual Reservations

Compilation of contractual reservations, if any, in technical and/or financial respect.

2.17.2 Information of Suppliers

Information brochures of the considered suppliers, along with descriptions, specifications, certificates, sketches or drawings on their respective supply items.

2.17.3 Standards for Materials

Information on any standards and codes, equivalent but other than those prescribed in the CONTRACT for the supply of materials or for the execution of the construction Work.

2.17.4 Time Schedule

Binding preliminary time schedule.

2.17.5 Special Sequences and Methods

Description and justification of any method or sequence for the construction, manufacture or fabrication of any part of Work along with a binding statement that all additional suppliers and performances required in connection with such special methods or sequences have been included in the respective rates filled by the Tenderer in the Bill of Quantities.

2.18 Bid Bond:

Each Tender must be accompanied with 2% of Contract Value **in favor of the OWNER, in the form of Pay Order/ Demand Draft from a Schedule Bank**

The Bid Bond of un-successful Tenderers shall be returned:

1. After execution of agreement with the successful Tenderer, or
2. If all Tenders are rejected, after such rejection, or
3. After thirty (30) days from the opening of Tenders.

The Bid Bond of the successful Tenderer will be released only after the

Agreement of CONTRACT has been signed and the Performance Bond has been deposited by him as per Clause 3.13.

2.19 Delivery of Tender Documents:

Tender Documents is to be sealed in a separate envelope and is to bear the name and address of the Tenderer, and is to be inscribed as follows:

**"Tender for
CONSTRUCTION OF
IBA COMMUNITY COLLEGE, JACOBABAD**

The Tenders should be submitted at the following address:

Engr. Ubedullah Soomro
Project Director
Sukkur IBA University
Nisar Ahmed Siddiqui Road
Sukkur-65200

2.20 Time of Delivery:

The original Tender set must reach the Addressee above, before the time & date fixed in writing by ARCHITECT for opening of the tenders. Tenders received after such time and date will be rejected.

2.21 Checking and Evaluation of Tender:

Subsequent to their opening, Tenders will be checked and evaluated by the ARCHITECT. The Tender of any Tenderer who has not fully conformed with these instructions may be rejected.

2.22 Arithmetical Corrections:

The ARCHITECT shall have the right to adjust arithmetical errors in any Tender. If the ARCHITECT and/or PROJECT MANAGER discover major errors and/or omissions in any Tender, he may require the Tenderer to adjust the same, but in such cases the Tenderer will not be permitted to change the basic rates. If any discrepancy is found, the relevant rates in words so arrived at will be considered in assessing the Tender.

2.23 OWNER's right of Rejection:

THE OWNER RESERVES THE RIGHT TO REJECT ANY TENDER WITHOUT GIVING ANY REASON, OR TO ACCEPT ANY TENDER IN WHOLE OR IN PART AND DOES NOT BIND HIMSELF TO ACCEPT THE LOWEST OR ANY TENDER.

2.24 Discussions after Acceptance of Tender:

The Tenderer, whose Tender may be accepted will be required to send authorized representatives at their own expense for necessary technical and contractual discussions, as the case may be, for drafting the Agreement of CONTRACT.

2.25 Letter of Award of Work:

The Tenderer whose Tender may be accepted will, after all discussions as in 2.25, receive a Letter of Award of Work, after which Tenderer will be deemed to have been awarded the Work, and all covenants of the CONTRACT Documents will be applicable immediately on all parties concerned, until the formal Agreement of CONTRACT has been signed.

2.26 Enter into Agreement:

The Tenderer who has been issued Letter of Award of Work will be required to enter into the Agreement of CONTRACT, the form of which (subject to any necessary adoptions), will be as set out in APPENDIX I to the Conditions of CONTRACT, within thirty (30) days after issue of Letter of Award of Work.

2.27 Amendments, Addenda, Corrigenda:

The right is reserved to amend any of the Tender Documents or to issue additions to them prior to the due date for submitting Tenders. All such amendments and/or additions will be advised not later than **3 (Three) days** before Tenders are due. It is mandatory that the Tender shall include the latest amendment and/or additions to the Tender Documents. The drawings mentioned in 2.5 of the Tender Documents as revised during the aforesaid period shall be deemed to be Drawings referred to in the CONTRACT upon which the sums named in the Tender are based.

When the Tenderer is informed of any amendment, addition or revision of the Tender Documents, he is required to immediately acknowledge receipt of same to the following:

**HABIB FIDA ALI,
Chartered,
4, Choudhry Khaliqzaman Road,
Karachi-75530,
Pakistan.**

3. CONDITIONS OF CONTRACT

Pages 3 -1 to 3 - 39

3.1 Distribution of Correspondence:

CONTRACTOR shall prepare 6 (Six) copies of all correspondence with OWNER, ARCHITECT and CONSULTANT. This is in addition to copies which may be required to be sent to other parties as the case may require.

3.2 Drawings and Specifications:

3.2.1 Issue and quantity of Drawings

After receiving Letter of Award of WORK, CONTRACTOR, upon instructions from the OWNER, shall receive from ARCHITECT and CONSULTANT two **(2) sets of Drawings** labeled "Good for Construction", out of which one (1) set will be preserved at SITE in a cellophane envelope for use of OWNER and/or ARCHITECT and/or CONSULTANT. Subsequently, all further Drawings issued to CONTRACTOR will be in **duplicate**, as mentioned. ARCHITECT and/or CONSULTANT shall furnish with reasonable promptness, additional instructions, by means of Drawings or otherwise, necessary for the proper execution of the WORK. All such Drawings and instructions shall be consistent with the CONTRACT, true developments thereof, and reasonably inferable there from. The WORK shall be executed in conformity therewith and the CONTRACTOR shall not WORK without proper Drawings and instructions.

3.2.2 Drawings part of Specifications

All Drawings, together with such notes, interlineations, figures and details, as may be noted thereon, shall be considered as a part of and complementary to the Specifications.

3.2.3 Scales of Drawings

Full size Drawings and large scale details shall, in general, govern and take precedence over small scale drawings which they are intended to amplify.

3.2.4 Written Dimensions to be followed

Written dimensions shall govern in laying out WORK, and no work shall be executed from dimensions obtained by scaling Drawings.

3.2.5 Trade Classifications

While the Specifications are sub-divided into trades, CONTRACTOR, shall, nevertheless, furnish all labour and materials necessary to complete all his WORK in accord with the CONTRACT, despite the fact that it may not appear under the WORK specified for the particular trade which it would be normally classified.

3.2.6 Errors and Omissions

CONTRACTOR shall check all Drawings furnished to him immediately upon receipt. These Drawings shall not be altered by CONTRACTOR but should any error or inconsistency appear, or in the event of any doubt or question arising in respect to true meaning and intent of Drawings or Specifications, or should any thing be omitted from the Drawings or Specifications, which is necessary for a clear understanding of the WORK, he shall promptly report facts in writing to the ARCHITECT and/or OWNER within 15 days of issue of drawings, who will make any/all necessary corrections and/or decisions and advise OWNER.

3.2.7 Difficult Design or Specifications

If, in CONTRACTOR's opinion, any WORK is shown on Drawings or called for in Specifications in such a manner as to make it impossible for him to produce or guarantee a first-class piece of WORK, and which, in spite of all reasonable care and diligence, could not have been identified at the time of preparing his Tender, he shall refer such facts in writing to ARCHITECT and/or OWNER and wait for reply before proceeding with the execution of such WORK.

3.2.8 Lack of information from ARCHITECT and/or CONSULTANT

If at any time ARCHITECT and/or CONSULTANT shall fail to supply sufficient or clear information to enable CONTRACTOR to proceed with WORK, CONTRACTOR shall immediately notify the ARCHITECT and/or CONSULTANT in writing, and in no case, will lack of such information, or any failure to understand Drawings or Specifications or ignorance of contents of either, be considered or received as an excuse for improper or inferior design, workmanship or materials, or for any delay in performing WORK, or as a justification for any claim for extra work or materials. Should any question or disagreement arise concerning meaning of Drawings or Specifications, such questions or disagreement shall be settled by ARCHITECT and/or CONSULTANT, whose decision in writing shall be final.

3.2.9 Extra Specification WORK

In the case of any class of WORK for which there are no specifications in the Tender, such work is to be carried out in all respects as per the instruction and requirement of the ARCHITECT and/or OWNER. 15% markup will be given to the Contractor on prime cost of items of work which are not included in BOQ's & the OWNER has asked Contractor to perform. However, any job, which is required by the OWNER to be done on daily work basis, shall be paid 25% extra to cover the over head and for the coordination supervision on actual cost of material and basic labor rates as below:

Un-skilled labor	Rs. 500 per 8 hrs.
Semi skilled labor	Rs. 600 per 8 hrs
Skilled labor	Rs. 800 per 8 hrs.

3.2.10 Drawings and Specifications on SITE

Out of, or in addition to, the requirements of Clause 3.2.1, the CONTRACTOR shall keep at least one (1) copy of all Drawings and Specifications at the SITE in good order and available to OWNER, ARCHITECT and CONSULTANT or their representatives. These Drawings and Specifications shall be kept up to date at all times and show all construction changes.

3.2.11 Conflict with Trade Unions

Wherever the provision of any section of Specifications may conflict with any agreements or regulations of any kind in force among members of any Trade Associations, Union or Council which regulate or distinguished what work shall or shall not be included in the work of any particular trade, CONTRACTOR must make all necessary arrangements of his own to reconcile any such conflict of provisions without recourse to the OWNER, ARCHITECT and/or CONSULTANT.

3.2.12 Ownership of Drawings and Specifications

Drawings and Specifications are and shall remain property of the ARCHITECT and/or CONSULTANT. These are furnished to the CONTRACTOR as instruments of service. They are not to be used on any other work, shall be preserved and, if required, with exception of the signed CONTRACT set, shall be returned to the ARCHITECT and/or CONSULTANT prior to issue of Certificate of Final Payment.

3.3 Shop Drawings:

3.3.1 General

Wherever in the execution of the CONTRACT, nature of WORK makes it necessary, and where specifically required by the Specifications, CONTRACTOR shall himself or cause his material vendor, fabricator or sub-Contractor to submit 3 sets of scale and full-size Shop Drawings of his WORK to the ARCHITECT and/or CONSULTANT. Shop Drawings must be complete in every detail including provision required of various trades, connections with other work, all cutting, fitting and drilling required and any and all other necessary information in accord with usual and customary trade practice as particularly required for any special purposes.

3.3.2 Submission to Authorities

When drawings are required to be submitted to Authorities, it shall be duty of the CONTRACTOR to submit them to secure approval of said Authorities and notify OWNER and ARCHITECT and/or CONSULTANT of action taken.

3.3.3 ARCHITECT's Approval

It is to be understood that prior to manufacture, fabrication or installation of WORK under CONTRACT, Shop drawings shall be prepared and reproducible of each submitted to ARCHITECT and/or OWNER for approval. No WORK will be executed in any instance prior to approval by the ARCHITECT and/or OWNER of any respective Shop drgs. ARCHITECT and/or OWNER 's approval, however, shall not relieve CONTRACTOR of responsibility for accuracy, as such approval of Shop drawings is only general and is not intended to serve as a check, and does not relieve CONTRACTOR from furnishing the materials and performing the WORK as required by Drawings and Specifications.

3.3.4 Cross Reference to ARCHITECT's Drawings

So far as practicable, each Shop drawing shall bear a cross reference note referring to sheet number or numbers of ARCHITECT and/or CONSULTANT's Drawings showing same WORK in order to facilitate checking of Shop drawings in ARCHITECT and/or CONSULTANT's office and their prompt return to CONTRACTOR.

3.3.5 Verification and Timely Submission

It is CONTRACTOR's obligation and responsibility to check and verify all dimensions and be fully responsible for them and for their coordination with connecting WORK. CONTRACTOR is responsible for submission of vendors' and/or fabricators' Shop drawings in proper rotation, that is, where Shop drawings of one trade are dependent upon Shop drawings of another trade,

proper Shop drawings shall be submitted first. No extension of time in respect to the Final Completion date will be granted to CONTRACTOR because of failure to have any Shop drawings submitted in ample time to allow for checking and approval. The CONTRACTOR along with programme of work in 3.6.2. will also submit within 7 days after the issue of Letter of Award the dates when the shop drawings will be submitted for approval.

3.3.6 CONTRACTOR's Stamp for approval

All Shop drawings submitted by CONTRACTOR shall bear approval of CONTRACTOR as evidence that drawings have been checked by CONTRACTOR.

3.3.7 Letter of Transmittal

Each consignment of Shop drawings submitted for approval must be accompanied by a letter of transmittal itemizing applicable work and number of the drawings.

3.3.8 Coordination between various Trades

CONTRACTOR shall obtain all prints from sub-Contractors as necessary for construction purpose and the coordination of other trades and distribute them to all parties concerned.

3.4 As Built Drawings:

3.4.1 General

CONTRACTOR during progress of WORK, shall keep a careful record of Drawings or all changes and corrections from layouts as shown on Drawings. Upon completion CONTRACTOR shall mark up a set of reproducible furnished by the ARCHITECT and/or CONSULTANT, showing the WORK as actually constructed. These drawings shall be delivered to the ARCHITECT and/or OWNER as a condition of "Final Payment".

3.5 Materials and Workmanship:

3.5.1 General

All types of materials, articles, or processes shall be of the respective kinds or brands relating to kind, quality, function and characteristics required by the Specifications or specified hereinafter. Where various kinds and brands are not so specified they shall be the best obtainable for required purposes. Where a specific item or type of material is specified in any portion of the Specifications and/or followed by the words "or equivalent" or "as equal" or words of similar intent, CONTRACTOR shall base his Bid Proposal upon said item or type of material as specified. The CONTRACTOR may, however, submit a written request, seeking permission to utilize a substitute item or material. The CONTRACTOR shall handle and take care of all materials used by him in performance of his

WORK, whether furnished by him or by other parties; as such materials are delivered at SITE, and shall pile, store, handle and protect them from injury. He shall deliver all materials at such times and in such quantities as will insure speedy and uninterrupted progress of WORK.

3.5.2 Samples

Where required in Specifications for various trades or otherwise required by ARCHITECT and/or OWNER, **samples of any materials to be used and of the finish to be applied in the WORK, shall be submitted by the CONTRACTOR for approval. Samples of all materials submitted for approval to the ARCHITECT and / or OWNER shall** be supplied, wherever reasonable, **in triplicate**, unless specified otherwise elsewhere in this CONTRACT, each sample bearing a neatly typed label bearing CONTRACTOR's name, name of sub-Contractor or producer of materials, kind, quality and finish or formula (where applicable, as in the case of liquids or paints) intended use or location, date of submission. Written approval shall be obtained prior to processing or fabrication of any materials for which samples are submitted and all finished WORK shall conform thereto and/or comply with characteristics of approved samples. In no instance shall approval of samples relieve the CONTRACTOR of full compliance with any Specification requirement.

3.5.3 Inspection

For purpose of inspection OWNER and ARCHITECT and/or CONSULTANT and their representatives shall, at all times, have access to WORK, wherever it is in preparation or progress, and CONTRACTOR at his expense, shall provide proper facilities for such access and for inspection; but such right of inspection and any actual inspection, shall in no way relieve the CONTRACTOR from performance of the WORK in accord with requirements of CONTRACT or from any other duty, obligation or liability imposed upon him by the CONTRACT. The fact that materials have been accepted at shop or wherever the WORK is in preparation or progress shall not prevent its rejection under provisions hereto at building either before or after its installation. If any such WORK should be covered up without approval or consent of the ARCHITECT and/or CONSULTANT, it must, if required by OWNER, and/or ARCHITECT and/or CONSULTANT, be uncovered for examination at CONTRACTOR's expenses. Wherever so required by OWNER and/or ARCHITECT and/or CONSULTANT shall render a detailed report of condition of WORK in shop or at SITE.

3.5.4 ARCHITECT and/or CONSULTANT sole judge for Quality

The intent herein is that each and every type and/or kind of material shall be fabricated and finished and erected and/or installed in best known possible manner by skilled artisans and mechanics, or so as to be rated "first class" in the opinion and judgment of ARCHITECT and/or OWNER and whose judgment and opinion shall be conclusive and final and not a subject for arbitration or appeal.

3.6 Construction Procedures:

3.6.1 Commencement of WORK

The CONTRACTOR shall commence WORK on the SITE within a period of **seven (7)** days after the receipt by him of Letter of Award of WORK from OWNER.

3.6.2 Programme of WORK

Within **Seven (7) calendar days** after the issue of Letter of Award, the CONTRACTOR must submit detailed time schedules including material procurement, labour employment and installation schedules for WORKS to the ARCHITECT and/or OWNER for checking and approval. The submittal to and approval by the ARCHITECT and/or OWNER of such a programme or the furnishing of such particulars shall not relieve the CONTRACTOR of any of his duties or responsibilities under the CONTRACT. The CONTRACTOR'S programme shall show in the form of Bar Chart, the various SITE and off-SITE activities to be followed for the timely execution of the WORK. Revised programmes and analyses shall be furnished by the CONTRACTOR as may be required by the ARCHITECT and/or OWNER should the scheduled progress of the WORK fail to be maintained.

3.6.2.1 Time Schedule

The CONTRACTOR shall submit a time schedule within 7 days of issue of Letter of Award clearly illustrating a general planned progress of the entire WORK commencing with the SITE installation, the item wise delivery dates at the SITE for the required equipment and materials, the construction programme in various Phases and ending with the SITE clearance after completion of WORK. Time schedule which the CONTRACTOR has already submitted in outline form with his Tender is preliminary but binding in so far as the important and key dates in accordance with the General Time Schedule of the Tender Documents are concerned. The time schedule is to be adjusted from time to time according to the actual progress of the WORK with the definite condition that the final contractual completion date will remain unchanged unless extension of time is approved in accordance with the CONTRACT.

3.6.2.2 Construction Programme and Labour Schedule

Likewise the CONTRACTOR will submit within 3 days of issue of Letter of Award, comprehensive construction programmes and labour employment schedules based on his Tender to the ARCHITECT and/or OWNER. These documents will also be reviewed and adjusted from time to time as per the progress of the WORK. The CONTRACTOR shall at any time, whenever required by the ARCHITECT and/or OWNER furnish for his information particulars in writing of the CONTRACTOR's arrangements for the carrying out of the WORK and of the Construction Plant and Temporary WORK which the CONTRACTOR intends to supply, use or construct as the case may be. The submission to and approval by the ARCHITECT and/or OWNER of such programmes or the furnishing of such particulars shall not relieve the CONTRACTOR of any of his duties or responsibilities under the CONTRACT.

3.6.3 Project Signs and Advertising

Right is reserved by the OWNER to erect such signs of any kind or character as are deemed appropriate on or about premises in connection with the WORK. The CONTRACTOR shall in no instance display and/or permit to be displayed on or about the WORK, any sign, trademark, poster or other advertising device, except as may be approved by the ARCHITECT and/or OWNER.

3.6.4 Use of SITE

The SITE is to be kept clear for safety and to facilitate inspection by OWNER/ ARCHITECT/ CONSULTANT and for repaid progress of the work. Before the end of the day all loose materials such as broken bricks, loose mortar/ concrete, unused bamboo props, planks, nails etc. shall be removed from construction area and dumped in safe place.

3.6.5 Residence on SITE

No employees of CONTRACTOR, unless authorised by the ARCHITECT and/or OWNER, will be permitted to live on SITE.

3.6.6 Setting Out

CONTRACTOR will have to layout the WORK as per the drawings. CONTRACTOR will be responsible for all errors that may be subsequently found and he will remedy them at his own expenses.

3.6.7 Setting out by other Contractors

If certain portion of WORK has already been done by other Contractors, the CONTRACTOR is to check all the dimensions in the work already performed and to report in writing, any

discrepancies between these and ARCHITECT and/or CONSULTANT'S drawings before confirming possession of the SITE. Once he has taken possession, the CONTRACTOR will be responsible for error that may subsequently be found in the visible portions of other Contractors' work and will have to remedy the same at his own expenses.

3.6.8 Care of the WORK

3.6.8.1 From the commencement of the WORK at SITE until their completion and acceptance by the OWNER, the CONTRACTOR is fully responsible for their care including the Temporary Works, even if they should have been executed by any other contractor. If the WORK at the SITE or part thereof; materials, equipment, construction/fabrication and erection Plant, or the Temporary Works suffer damage, loss or impairment from any cause whatsoever (save and except the excepted risks) the CONTRACTOR shall at his own expenses repair and make good the same so that they are in good condition upon final acceptance of each phase or part of the WORK and in full conformity with the instructions. If damage, loss or impairment occur at the SITE due to an excepted risk, the CONTRACTOR shall, repair and make good the same as aforementioned at his own cost. The CONTRACTOR shall also be liable for any damage to the WORK caused by him or by his agents, servants, employees or Sub-Contractors in the course of any operation in the fulfillment of his obligations under these Conditions of CONTRACT.

3.6.8.2 The "excepted risks" are war hostilities (whether war be declared or not), invasion, act of foreign enemies, rebellion, revolution, insurrection and civil war, curfew and national or local general strike, riots, commotion, etc., all to be applicable only if occurring in Pakistan and affecting the WORK at SITE, or (otherwise than among CONTRACTOR'S own employees), which may render it physically impossible to enter the WORK SITE by the CONTRACTOR'S workmen, or the use or occupation by the OWNER of any portion of the WORK in respect of which a certificate of completion has been issued (all of which are herein collectively referred to as "the excepted risks")

3.6.9 Progress Report

The CONTRACTOR shall submit in triplicate, 3rd day of every month, Progress Report, along with photographs, to the ARCHITECT and/or OWNER. The report shall also include daily record of labour at site and Addition/ Withdrawal of Equipment from site. The date of submission and proforma of such Progress Report shall be approved by the ARCHITECT and/or OWNER or amended from time as found necessary. All

assistance by the CONTRACTOR shall be given to the ARCHITECT and/or OWNER as and when assessment of such progress is to be made by the ARCHITECT and/or OWNER.

3.6.10 SITE Instruction Book

The CONTRACTOR shall maintain a SITE Instruction Book (of triplicate leaves) and proforma as approved by the ARCHITECT and/or OWNER for taking instructions and directions of the ARCHITECT and/or OWNER at the SITE.

3.6.11 Tools and Stores

The Contractor will provide within 3 days of the letter of Intent a schedule of all materials, stores, plant, tools and temporary works requisite for the execution of work. The CONTRACTOR shall supply at his own cost materials, (except such special materials, if any, as may in accordance with the CONTRACT to be supplied by the OWNER) stores, plant, tools, implements, ladders, cordage, tackle and Temporary Works requisite for the proper execution of the WORK, whether original, altered or substituted, and whether included in the Specifications or other documents forming part of this CONTRACT, or referred to in these Conditions or not, or which may be necessary for the purposes of satisfying or complying with the requirements of the OWNER as to any matter as to which under these conditions they are entitled to be satisfied, or which they are entitled to require together with carriage thereof to and from the work. CONTRACTOR shall also supply without charge the requisite number of persons with means and materials necessary for the purpose of setting out WORK, and counting, weighing and assisting in the measurement or examination at any time and from time to time of the WORK or materials. Failing his so doing, the same may be provided by OWNER at the expenses of the CONTRACTOR and the expenses may be deducted from any money due to the CONTRACTOR under the CONTRACT, or from the Security Retention or the proceeds of sale thereof, or a sufficient portion thereof. All construction plant, Temporary Works and materials provided by the CONTRACTOR shall when brought onto SITE be deemed to be exclusively intended for the construction and completion of the WORK under the CONTRACT. All construction plant, Temporary Works and materials, when brought onto SITE shall be deemed to be in possession and control for all intents and purposes of the ARCHITECT and/or OWNER and the CONTRACTOR or anyone else authorized by the CONTRACTOR shall not remove such construction plant, Temporary Works and materials without the prior written permission of the ARCHITECT and/or OWNER. The CONTRACTOR shall ensure that the construction plant brought on SITE is his own property and free from any charge or encumbrances whatsoever. The

ARCHITECT and/or OWNER will however, accord the CONTRACTOR the exclusive use of such construction plant, Temporary Works and materials for the construction and completion of WORK, provided that the case does not occur which gives the OWNER the right to expel the CONTRACTOR from the SITE and to continue with the WORK himself. After final dismantling of any such construction plant, Temporary Works or materials for temporary use with the approval of ARCHITECT and/or OWNER, these shall be deemed to be transferred back as the CONTRACTOR's property again. After completion of the WORK, the rest of the said construction plant and Temporary Works as well as any unused materials supplied by the CONTRACTOR, will likewise be transferred back to the CONTRACTOR, and shall be removed from the SITE in accordance with Clause 3.9.2. Should the CONTRACTOR neglect after completion of the WORK, to remove any of the aforesaid construction plant, Temporary Works or un-used materials, within a reasonable period approved by the ARCHITECT and/or OWNER, the CONTRACTOR shall be responsible for all damages done to that in the course of other works being carried out at SITE and for all such costs as in the opinion of the ARCHITECT and/or OWNER had to be incurred in order to relocate the said plant and material or to clear the same. The OWNER, ARCHITECT and CONSULTANT shall not at any time be liable for the loss or damage to any of the construction plant, Temporary Works or materials available at the SITE.

3.6.12 Bar Bending Schedule

The CONTRACTOR shall provide bar bending schedule for the approval of ARCHITECT and or CONSULTANT.

3.6.13 Removal of Plants and Structures

CONTRACTOR shall not remove any construction plants, temporary structure or material or any part thereof from the SITE without the written consent of the ARCHITECT and/or OWNER which shall not be unreasonably withheld when the same is not required for the purpose of completion of the WORK but the ARCHITECT and/or OWNER will permit the CONTRACTOR the exclusive use of all such constructional plant, temporary structure and material in and for the completion of WORK until the occurrence of any event which gives OWNER the right to exclude the CONTRACTOR from the SITE and proceed with the completion of the WORK. Should the CONTRACTOR fail to clear the SITE of Construction Plant, Temporary Works and Material, the ARCHITECT and/or OWNER shall be entitled to remove/store the same at the cost and consequences of CONTRACTOR.

3.6.14 Existing Utilities

The CONTRACTOR will observe that the SITE may be encumbered with miscellaneous public utility facilities, and the like, and CONTRACTOR assumes all responsibility for the removal, relocation and/or modification, or otherwise in conformity to any Public Utility Rules, Regulations and requirements and as may be required otherwise by the CONTRACT Drawings and Specifications, as applicable for the execution of the WORK.

3.6.15 Protective Measures

CONTRACTOR shall:

3.6.15.1 WORK and Material: Carefully protect all WORK and materials, including materials delivered to him by the OWNER until they are finished and accepted in writing by the ARCHITECT and/or OWNER. If any WORK or materials shall be damaged prior to such acceptance, CONTRACTOR shall when directed in writing by the ARCHITECT and/or OWNER, and at the CONTRACTOR's expenses, replace all defective or damaged WORK or materials. The CONTRACTOR shall keep all streets free from encumbrances, and use for storage of materials, tools and apparatus only such portion of the premises or streets as may be approved by the ARCHITECT and/or OWNER and to limits as indicated by local laws, ordinances and permits. CONTRACTOR hereby assumes full responsibility for loss of or damages to any materials, tools and apparatus, cloths or property on SITE until final acceptance and shall protect all work and material till final completion of work.

3.6.15.2 Workmen and Public: Take all usual and necessary precautions to prevent accidents or injury to all persons, and any damage to property on, about or adjacent to premises where WORK is being performed and erect and keep in place at all times all usual, proper, necessary and required danger signs, safeguards and fencing. CONTRACTOR shall indemnify

OWNER and ARCHITECT, and all their authorised representatives, against any claim, suits, damages and judgments, including Counsel fees and disbursements incurred in defence of any action, of which they may be subjected or which they may suffer by reason of any injury to persons or property resulting from negligence or carelessness on part of the CONTRACTOR or his sub-Contractors, agents or employees, in performance of WORK, or arising out of WORK performed hereunder.

3.6.15.3 Emergencies: In any emergency affecting safety of

life or of WORK or of adjoining property, CONTRACTOR without special instruction or authorization from OWNER or ARCHITECT and/or CONSULTANT, is hereby permitted to act at his discretion, to prevent such threatened loss of injury, and he shall so act, without appeal if so instructed / authorised.

3.6.15.4 Accidents: Should a serious or fatal accident occur at SITE during construction CONTRACTOR shall immediately notify OWNER and ARCHITECT and/or CONSULTANT and cause an investigation to be conducted at once into cause of such accident and full testimony taken with photographs, and tests, to determine complete cause thereof. Such investigations shall be reported in writing upon Insurer's "Accident Report Forms", and/or as may be authorised otherwise. Insurance of all employed will be made by the CONTRACTOR as per Labor Laws.

3.6.15.5 Utilities and WORK: In addition to requirements indicated herein, protect any utilities and WORK of any kind against damage or interruption of service except as specifically directed or authorised. Damage or interruption of service resulting from failure so to do shall be repaired and/or restored promptly by or at the expense of the CONTRACTOR without cost to the OWNER.

3.6.15.6 Fire Provide: Adequate protection against fire hazards and observe all care precautions against such hazards. ARCHITECT and/or OWNER shall be the sole judge as to the adequacy or otherwise of such measures. Damage by fire will be made good by the CONTRACTOR at his own expense.

3.6.15.7 Watchmen: Provide adequate and competent watchmen, to guard the WORK from time the WORK is commenced until "Certificate of Final Acceptance" is issued and/or until ARCHITECT and/or OWNER directs otherwise. In the event that the ARCHITECT and/or OWNER at any time determines the watchmen's service inadequate or incompetent, and after notifying the services or corrective action as deemed necessary by the ARCHITECT and/or OWNER and all costs thereof shall be deductible from any sums due to the CONTRACTOR.

3.6.15.8 Adjacent Properties and Structures: Unless permitted otherwise by the ARCHITECT and/or OWNER, the CONTRACTOR shall ensure to the maximum that his execution of the WORK, in no way or manner whatsoever, effects or influences properties or structures adjacent to the SITE. ARCHITECT and/or OWNER will be sole and final judge as to the extent of such influences or effects, and as to the placement

of responsibility for the same influence or effects, if any.

3.6.16 SITE Staff

3.6.16.1 CONTRACTOR shall employ one or more competent agents or representatives, whose name or names shall have been previously communicated in writing to OWNER and their approval obtained, which may be withdrawn at any time, to superintend the carrying out of WORK on SITE. The said agent, or if more than one shall be employed then one of such agents shall be on the SITE during WORK hours, and may receive any orders or instructions which the ARCHITECT and/or OWNER or their representative may give to the said agent, and these orders or instructions shall be deemed to have been given to the CONTRACTOR. The CONTRACTOR must employ on the SITE of WORK sufficient number of qualified engineers and assistants who can understand drawings and Specifications, etc., throughout the WORK time. Such staff must be approved by the ARCHITECT and/or OWNER.

3.6.16.2 The CONTRACTOR shall be responsible to the OWNER for the acts and omissions of the CONTRACTOR's employees, sub-Contractors and their agents and employees, and any other persons performing any of the WORK under this CONTRACT.

3.6.16.3 The CONTRACTOR shall at all times enforce strict discipline and good order among the CONTRACTOR's employees and shall not employ on the WORK any unfit person or anyone not skilled in the task assigned.

3.6.17 Action against Staff

OWNER and ARCHITECT and/or CONSULTANT shall be at liberty to object to and to require CONTRACTOR to remove forthwith from SITE, the agent or any other person employed by the CONTRACTOR who in the opinion of OWNER and/or ARCHITECT and/or CONSULTANT misconducts himself or is incompetent or not skilled enough or negligent in the proper performance of his duties or whose employment is otherwise considered by the OWNER and/or ARCHITECT and/or CONSULTANT to be undesirable and such person shall not be again employed for the purpose or, or in connection with, the WORK without the written permission of the ARCHITECT and/or OWNER. Any person so removed shall be replaced, as soon as possible, by a competent substitute who shall be better skilled and approved by ARCHITECT and/or OWNER.

3.6.18 Temporary Construction Utilities

3.6.18.1 General: It shall be the obligation of CONTRACTOR to assume responsibility for installation and maintenance of the following temporary utilities which are to be provided for the use of all concerned including testing without additional cost or expense to the OWNER.

3.6.18.2 Toilets: CONTRACTOR shall provide adequate toilet facilities to his workmen and in no way shall the OWNER or any party other than CONTRACTOR be responsible to provide the same.

3.6.19 Labour Laws

All workmen/labour/staff employed by the CONTRACTOR for the purpose of CONTRACT shall for all intents and purposes be the employees of the CONTRACTOR and the OWNER shall not be responsible for them in any manner whatsoever. The CONTRACTOR shall ensure that he shall comply with all labour laws in connection with engagement of his employees and shall indemnify the OWNER of any claim whatsoever in connection with their employment, non-employment, terms of employment, etc.

3.6.19.1 Underage and Female Labour: No labour shall be employed on the WORK whose age is below the statutory age limit for such WORK in Pakistan. Employment of female labour shall be subject to local bye-laws and regulations.

3.6.19.2 Fair Wages: The CONTRACTOR shall pay not less than fair wages to labourers engaged by him on the WORK. "Fair Wages" means wage whether for time or piece of WORK notified at the time of inviting Tenders for the WORK and where such wages have not been so notified, the rates prescribed by the Government for the district in which the WORK is done. CONTRACTOR shall, notwithstanding the provisions of any CONTRACT to the contrary, cause to be paid fair wage to labourers indirectly engaged on the WORK, including any labour engaged by his authorized sub-Contractors in connection with the said WORK as if the labourers had been immediately employed by him.

3.6.19.3 Government Regulations: In respect of all labourers directly or indirectly employed, in the WORK for the performance of the CONTRACTOR'S part of this Agreement, the CONTRACTOR shall comply with Government's Labour Regulations.

3.6.19.4 OWNER's Rights: OWNER shall have the right to deduct from the monies due to the CONTRACTOR any sum(s) required or estimated to be required for making good the loss suffered by a worker by reasons of non-fulfillment of the Conditions of CONTRACT for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by the terms of the CONTRACT or non-observance of the regulations.

3.6.19.5 Government Regulations Part of CONTRACT The Regulations aforesaid shall be deemed to be a part of this CONTRACT and any breach thereof shall be a breach of this CONTRACT.

3.6.19.6 Compensation by OWNER In case in which by virtue of the provisions of said Government Regulations, OWNER is required to make any payment, to workers, OWNER will recover from the CONTRACTOR the amount of the compensation so paid and without prejudice to the rights of the OWNER. The OWNER shall be at his liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by the OWNER to the CONTRACTOR whether under this CONTRACT or otherwise.

3.7 Subletting of CONTRACT WORK (Sub-Contractors)

3.7.1 General

Should CONTRACTOR desire to sublet any portion of the WORK, he shall make such request to ARCHITECT and/or OWNER in writing, giving name and address of proposed Sub-Contractor defining portion of WORK desired to be sublet. This shall be done before CONTRACTOR in any manner obligates himself to any Sub-Contractor.

OWNER reserves the right to add to CONTRACTOR's Tendering list names of other Sub-Contractors in any or all branches of the WORK of Sub-Contractors mentioned in CONTRACTOR'S proposals. No WORK shall be sublet without approval, in writing, of the ARCHITECT and/or OWNER where materials are being furnished. CONTRACTOR agrees to be bound by terms of the CONTRACT as far as applicable.

3.8 Bad WORK, Default, etc.

3.8.1 General

If it shall appear to the ARCHITECT and/or OWNER that any WORK has been executed with unsound, imperfect or unskilled

workmanship, or if materials of any articles provided by the CONTRACTOR for the execution of the WORK are unsound or of a quality inferior to that contracted for, or otherwise not in accordance with the CONTRACT, the CONTRACTOR, shall, on demand in writing from the ARCHITECT and/or OWNER specifying the WORK or materials or articles complained of, notwithstanding that, the same may have been inadvertently passed, certified and paid for, forthwith rectify, or remove and reconstruct the WORK so specified in whole or in part, as the case may require, remove the articles or materials so specified and provide other proper and suitable articles or materials at his own charge and cost. In the event of CONTRACTOR's failing to do so, no payments shall be made for the same till defects are rectified as per instructions of the ARCHITECT and/or OWNER, and in case where rectification or removal of defects or materials is not possible and work can be accepted otherwise, the rates for such items shall be reduced. In all such cases the decision of OWNER shall be final and binding on the CONTRACTOR.

3.8.2 Rectification by OWNER

If CONTRACTOR or his workmen or employees, while performing this CONTRACT shall break, deface, injure or destroy any part of a building, road, road curbs, fence, enclosure, water pipes, cables, drains, electric or telephone posts, wires, trees, grass or grassland or on which the WORK or any part of it is being executed; or if any damage shall happen to the WORK, while in progress, from any cause whatsoever, or any imperfections become apparent in it within "Period of Maintenance" CONTRACTOR shall make the same good at his own expense, or in default, OWNER, may cause the same to be made good by other workmen and deduct the expense, of which the certificate of ARCHITECT and/or OWNER shall be final, from any sums that may be then or at any time thereafter may become, due to the CONTRACTOR or from his Security Retention or the proceeds of sale thereof, or of a sufficient portion thereof. The Security Retention of

CONTRACTOR shall not be refunded before the expiry of satisfactory "Period of Maintenance" as in Clause 3.17.4 after the issue of the Final Certificate or otherwise of completion of WORK.

3.9 Completion

3.9.1 Final Certificate of Completion

On completion of WORK the CONTRACTOR shall so notify the ARCHITECT and/or OWNER in conducting inspections and any final tasks that may be prescribed by the CONTRACT to determine successful completion of the WORK.

CONTRACTOR shall be furnished with a Certificate by the OWNER of such completion, but no such Certificate shall be given, nor shall the WORK be considered to be complete until CONTRACTOR shall have removed from the premises on which the WORK shall be executed all surplus materials and rubbish, and cleaned off the SITE in, upon or about which the WORK is to be executed or which he may have had possession for the purpose of the execution thereof, nor until the WORK shall have been certified by the ARCHITECT and/or OWNER whose certificate shall be binding and conclusive against CONTRACTOR. If the CONTRACTOR shall fail to comply with the requirements of this Clause as to removal of surplus materials and rubbish, and cleaning off SITE on or before the date fixed for the Completion of the WORK, OWNER, and/or ARCHITECT and/or CONSULTANT may, and at the expense of CONTRACTOR order removal of materials and rubbish and disposal of the same as they think fit to clean off such dirt as aforesaid, and CONTRACTOR shall pay the amount of all expenses so incurred, and have no claim in respect of any such surplus materials as aforesaid except for any sum actually realised by the sale thereof. The "Period of Maintenance" of the WORK as specified in Clause 3.17.4 of these Conditions shall commence from the date of issue of such Final Certificate of Completion.

3.9.2 SITE Clearance

On Completion of WORK, or earlier as directed by the ARCHITECT and/or OWNER or as otherwise specified, CONTRACTOR shall remove all construction plant, Temporary structures erected by him at the SITE of WORK. Remove all debris, and shall leave the SITE in a neat and tidy condition to the satisfaction of the ARCHITECT and/or OWNER. All such WORK, however, shall be in conformity with Clause 3.6.15 of these Conditions of CONTRACT.

3.10 Payments

3.10.1 Interim Payments.

3.10.1.1 General:

Contractor shall submit five copies of all bills to OWNER who shall make 50% of the payment within 7 days after submission and the remaining 50% shall be paid after verification by the OWNER within **2 weeks** from the date of submission, or return the bill with observation within 7 days. But all such intermediate payment shall be regarded as payment as by way of advance against the final payment only and not as payment for WORK actually done and completed and shall not preclude the requiring of bad, unsound, and imperfect or unskilled WORK to be removed and taken away and reconstructed, or re-erected,

or to be considered as an admission of the due performance of the CONTRACTOR, or any part thereof in any respect, or the acceptance of any claim, nor shall it conclude, determine, or effect in any way the powers of the OWNER and ARCHITECT and/or CONSULTANT under these conditions, or in any other way vary or effect the CONTRACT. The ARCHITECT and/or OWNER shall have power to amend or withhold any Certificate if the WORK or any part thereof has not been carried out to the satisfaction of the OWNER, and/or ARCHITECT and/or CONSULTANT. The final bill shall be submitted by the CONTRACTOR within 1 (one) months of the date fixed for the completion of the WORK, unless otherwise allowed by the OWNER.

3.10.1.2 Secured Advances:

NO SECURED ADVANCE WILL BE PAID.

3.10.2 Measurement of WORK

3.10.2.1 General: The executed quantities will be determined by "in-place" measurement and thus computed. ARCHITECT and/or OWNER shall give 24 hour's notice to CONTRACTOR when he requires any part or parts of the WORK to be measured. CONTRACTOR shall forthwith attend or send an authorised representative to monitor the measurements. Should CONTRACTOR not attend or neglect or omit to send such representative then the measurement made by the ARCHITECT and/or OWNER or approved by him shall be taken to be correct measurement of the concerned part of the WORK. For measuring of such permanent WORK which is to be determined by records and drawings the CONTRACTOR must prepare the pertinent settlement of account documents monthly. Field measurements are to be prepared in triplicate at the spot out of which one copy countersigned by ARCHITECT and/or OWNER will be returned to the CONTRACTOR. Within seven (7) days after receipt of these documents ARCHITECT and/or OWNER will check and approve them or demand corrections and then sign corrected documents after renewed submission and approval.

3.10.2.2 Methods of Measurements: The WORK shall be measured net, notwithstanding any general or local custom except where otherwise specifically described or prescribed in the Specifications of WORK attached with the CONTRACT. Further details for methods of measurements are also stipulated in the Specs. under respective trades.

3.10.3 Lump Sums

When the estimate, on which a Tender is made, includes a Lump Sum in respect of parts of the WORK the CONTRACTOR shall be entitled to payment in respect of the items of WORK involved or the part of the WORK in question at the same rates as are payable under this CONTRACT for such items, or if the part of WORK in question is not, in the opinion of ARCHITECT and/or OWNER, capable of measurement, the ARCHITECT and/or OWNER may, at his discretion, recommend payment of the Lump Sum amount entered in the estimate, and the certification in writing of the OWNER shall be final and conclusive against CONTRACTOR with regard to any sum payable to him under the provision of this Clause.

3.10.4 Reduction of Rate

The OWNER shall have full power to reduce the rates for such items which have not been properly carried out but can be accepted otherwise. The decision of OWNER with respect to reduction of rates will be final and binding on the CONTRACTOR. This will apply to such items also which might have been paid in full earlier but defects are detected later.

3.10.5 Form of Payment

3.10.5.1 General: Payments due to CONTRACTOR will be made by crossed cheques only.

3.10.5.2 Interest : No interest will be paid to the CONTRACTOR or any body else, on CONTRACTOR's Earnest Money, Security Retention, amounts of bills or any other amounts of CONTRACTOR remaining with the OWNER for any period.

3.10.6 Deduction from Payments

Interim Payments will be made after deduction of the Retention Money and the like, as follows:

3.10.6.1 Security Retention: Deduction from the first and the following running bills of the CONTRACTOR as Security Retention at 10% (Ten percent) of gross amount of such running bills.

3.10.7 Final Payments

The CONTRACTOR shall submit to the ARCHITECT and/or OWNER following documents before receiving the final payments from the OWNER.

3.10.7.1 Completion Certificate: Completion Certificate for the whole of the WORK issued by the ARCHITECT and/or OWNER which shall signify the complete handing over of all parts of the WORK, under the CONTRACT, by the CONTRACTOR to the ARCHITECT and/or OWNER.

3.10.7.2 Affidavit to Quality: An affidavit by the CONTRACTOR, that the WORK has been executed according to a first-rate standard and sound engineering practices and have no concealed defects known to him.

3.10.7.3 Certificate of Agreement: Cert. of Agreement with all measures and decisions taken by the OWNER, the ARCHITECT and/or OWNER and their representatives in the course of and in connection with the WORK and the execution of the CONTRACT.

3.10.7.4 Release from Lien and Charge Release of Lien and Charge, according to which there is no lien or charge from him or from a third party, on any delivery or performance of the CONTRACT, in connection with the CONTRACT. The final payment will be made after all the above documents and Final Bill of the CONTRACTOR have been approved by the OWNER.

3.10.8 Liquidated Damages

3.10.8.1 Liquidated Damages If CONTRACTOR shall fail to complete the WORK within the time prescribed in Clause 3.17.2 or within the extended time, he shall pay to the OWNER as liquidated damages for such a default and not as a penalty, the following sum of money for every calendar day or part thereof which shall elapse between the time prescribed by Clause 3.17.2 of these Conditions or the extended time as the case may be, and respective dates of completion of the total WORK:

1 %(one percent) of Total Contract Price at the time of signing of CONTRACT, per week.

OWNER may without prejudice to any other method of recovery deduct the amount of such damages from any moneys in his hand due or which may become due to the CONTRACTOR. The payment or deduction of such damages shall not relieve CONTRACTOR from his obligations to complete the WORK, or from his obligations and liabilities under this CONTRACT.

3.10.9 Escalation:

All prices and unit rates in the CONTRACT are fixed and shall remain unchanged for the entire duration of the CONTRACT. If any Direct Tax is imposed by the Government on any of the items included in the CONTRACT, rates shall be adjusted accordingly, this does not include Indirect Tax. This adjustment shall be made only upon CONTRACTOR's furnishing to the OWNER sufficient documentary evidence of the rate of tax per item.

3.11 Insolvency, Breach of CONTRACT, Bankruptcy, etc:

3.11.1 CONTRACTOR's non-performance

3.11.1.1 Insolvency If CONTRACTOR shall become insolvent or have an order admitting a petition in insolvency made against him or shall present his petition in insolvency or shall make an agreement with assignment in favour of his creditors or shall agree to carry out the CONTRACT under a committee of inspection of his creditors or (other than a voluntary liquidation for purpose of amalgamation or reconstruction) assign the CONTRACT, without the consent in writing of OWNER first obtained or shall have an execution levied on his goods, or if ARCHITECT and/or CONSULTANT shall certify in writing to OWNER that in his opinion CONTRACTOR:

3.11.1.2 Abandonment of CONTRACT has abandoned the CONTRACT; or

3.11.1.3 Failure to Commence WORK

without reasonable excuse has failed to commence WORK or has suspended the progress of WORK for twenty eight (28) days after receiving from OWNER written notice to proceed; or

3.11.1.4 Failure to Remove Materials

has failed to remove materials from the SITE or to pull down and replace WORK for twenty eight (28) days after receiving from ARCHITECT and/or OWNER written notice that the said material or WORK has been condemned and rejected; or

3.11.1.5 WORK not in accordance with CONTRACT

is not executing WORK in accordance with CONTRACT or is persistently or flagrantly neglecting to carry out his obligations under the CONTRACT; or

3.11.1.6 Sub-letting

Has to the detriment of good workmanship or, in defiance of OWNER's and/or ARCHITECT's instructions to contrary, sub-let any part of the CONTRACT; or

3.11.1.7 Breach of CONTRACT

has committed breach of any of the terms and conditions of CONTRACT or in any case in which the CONTRACTOR shall have rendered himself liable to pay compensation.

3.11.2 OWNER's Rights

OWNER shall have power to adopt any of the following (or all courses as they may deem best suited to the interest of OWNER:

3.11.2.1 Rescission of CONTRACT, Forfeiture of Security Retention

To rescind the CONTRACT (to which rescission, notice in writing to the CONTRACTOR under the hand of OWNER shall be conclusive evidence) and in which case the Security Retention of CONTRACTOR shall stand forfeited, and be absolutely at the disposal of OWNER.

3.11.2.2 WORK by OWNER

To employ labour paid by OWNER and to supply materials to carry out the WORK, or any part of the WORK debiting CONTRACTOR with the cost of the labour and the price of materials (of the amount of which cost and price, a Certificate of OWNER and/or CONSULTANT shall be final and conclusive against the CONTRACTOR in all respect as if it had been carried out by the CONTRACTOR under the terms of his CONTRACT. The Certificate of the OWNER as to the value of the WORK done shall be final and conclusive against the CONTRACTOR.

3.11.2.3 WORK by Others

To measure up the WORK of the CONTRACTOR and to take such part thereof as shall be unexecuted out of his hands, and to give it to another Contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to CONTRACTOR if the whole would have been executed by him (of the amount of which excess the Certificate in writing of the ARCHITECT and/or OWNER shall be final and conclusive) shall be borne and paid by the CONTRACTOR and may be deducted from any money due to him by OWNER under the CONTRACT otherwise, or from his Security Retention or the proceeds of sale thereof or a sufficient part thereof. In the event of any of the above courses being adopted by OWNER, CONTRACTOR shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any material, or entered into engagements, or made by advances on account of, or with view to the execution of the WORK or the performance of the CONTRACT, and in case the CONTRACT shall be rescinded under the provision aforesaid, CONTRACTOR shall not be entitled to recover or to be paid any

sum for any WORK thereto or actually performed under this CONTRACT unless and until ARCHITECT and/or OWNER will have certified in writing the performance of such WORK and the value payable in respect thereof, CONTRACTOR shall only be entitled to be paid the value so certified on the completion of "Period of Maintenance".

3.11.3 Non-exercise by OWNER of his Rights

In any case in which any of the powers conferred upon OWNER by Clause 3.11.2 thereof shall have become exercisable and the same shall not be exercised, the non exercise thereof shall not constitute a waive of any of the conditions thereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the CONTRACTOR for which by any Clause or Clauses hereof he is declared to pay compensation amounting to the whole of his Security Retention, and the liability of the CONTRACTOR for past and future compensation shall remain unaffected.

3.11.4 Forfeiture and Disposal of Plants, Tools and Stores

In the event of OWNER putting in force any of the powers vested in them, under the preceding Clause 3.11.2, he or his duly authorized representatives may enter upon the WORK and use all temporary buildings and they may if they so desire, take possession of all or any tools, plants, materials and stores, in or upon the WORK, or the SITE thereof or belonging to the CONTRACTOR or procured by him and intended to be used for the execution of WORK or any part thereof, paying or allowing for the same in account at the CONTRACT rates or, in case of these not being applicable, at current market rates to be certified by ARCHITECT and/or OWNER, whose certificate thereof shall be final, otherwise OWNER may, by notice in writing to the CONTRACTOR or his supervisor, foreman, or other authorized agent require him to remove such tools, plant, materials or stores from the premises (within a time to be specified in such notice) and in the event of CONTRACTOR failing to comply with any such requisition, OWNER may remove them at CONTRACTOR's expenses or sell them by auction or private sale on account of CONTRACTOR and at his risk in all respect and the Certificate of the OWNER as to the expense of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against CONTRACTOR.

3.11.5 OWNER's Remedy of Default

If CONTRACTOR shall fail duly to observe or perform any requirements, instructions, directions or the order of the ARCHITECT and/or OWNER duly made or given in accordance with the CONTRACT, or shall otherwise fail to fulfill any obligation imposed upon him by the CONTRACT, OWNER may without prejudice to any other rights or remedies he may have, himself or by his servants or agents remedy such default and all expenses consequent thereon or incidental thereto shall be borne by the CONTRACTOR and shall be recoverable from him or may be deducted by OWNER from any money due to the CONTRACTOR.

3.11.6 Termination of CONTRACT on Sub-letting, Assigning or Bribing, etc.

The CONTRACT shall not be assigned or sublet without written approval of the OWNER. If CONTRACTOR shall assign or sublet his CONTRACT, or attempt to do so, or become insolvent or commence insolvency proceedings or mark any composition with his creditors, or attempt to do so, or if any bribe, gratuity, gift, loan, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given, promised or offered by the CONTRACTOR, or any of his servants or agents to any officer or person in the employment of OWNER or ARCHITECT and/or CONSULTANT in any way relating to their office or employment, OWNER may thereupon by notice in writing, terminate the CONTRACT and the Security Retention of the CONTRACTOR shall thereupon stand forfeited and be absolutely at the disposal of the OWNER and the same consequences shall ensue as if the CONTRACT had been rescinded under Clause 3.11.2.1 hereof, and, in addition, to recover or be paid for any WORK, actually performed under the CONTRACT.

OWNER may terminate contractor for convenience which will mean that if the OWNER decides to change its plan or is forced by the appropriate authority to suspend work then the OWNER may terminate the contract for convenience and so notify the CONTRACTOR etc.

3.12 Insurance:

3.12.1 Insurance to the WORK

3.12.1.1 General CONTRACTOR must conclude policies in the joint names of the OWNER and the CONTRACTOR against all damages and losses arising from any cause, insofar as he is responsible for them under the provisions of this CONTRACT. The insurance policies are to be concluded in such a manner

that the OWNER and the CONTRACTOR are covered during the entire period of construction, and in addition against losses and damages during the "Period of Maintenance", which arise from a cause occurring prior to the beginning of said "Period of Maintenance" including the losses or damages which are caused by the CONTRACTOR in the course of the fulfillment of his obligations under Clause 3.17.4 namely for:

- a) The WORK and Temporary Works, to their full replacement value, in local as well as in foreign currency, of such works executed from time to time.
- b) The Owner's supplied materials as well as materials, construction plant and other things brought to the SITE by CONTRACTOR to the full replacement value.
- c) The CONTRACTOR shall also submit Contractor's All Risk Policy covering all aforesaid risks as well.

The CONTRACTOR shall, whenever required, produce to the OWNER the policies of insurance and the receipts for payments of the current premiums. Provided always that without limiting his obligation and responsibilities as aforementioned, nothing contained in this Clause shall render CONTRACTOR liable to insure against the necessity for repair or reconstruction of any WORK constructed with materials or workmanship not in accordance with the requirements of the CONTRACT.

3.12.1.2 Payment of Damages Should the WORK or any part thereof or all or any of the Temporary Works or any part thereof or materials on SITE for incorporation in the WORK be damaged or lost during the continuance of insurance effected under Clause 3.12.1, any risk insured against, CONTRACTOR shall proceed with utmost dispatch to make good the damage or loss aforesaid and every sum of money received under the policy or policies shall be paid to OWNER and be paid by OWNER to the CONTRACTOR in such installments as the OWNER shall upon recommendation of ARCHITECT and/or CONSULTANT think proper and certify having regard to the progress made by the CONTRACTOR in making good the damage or loss aforesaid in and so far as such damage or loss ought in the opinion of ARCHITECT and/or OWNER to be made good for the proper execution of the WORK.

3.12.2 Damage to Persons and Property

The CONTRACTOR must indemnify and keep indemnified the OWNER and the ARCHITECT and/or CONSULTANT against

all losses and claims for injuries or damage to any person or any property whatsoever, which may arise out of or in consequence of the construction and maintenance of the WORK and against all claims, demands, proceedings, damages, costs, charges, and or in relation thereto. The CONTRACTOR is not allowed to claim any personal liability for or with regard to any matter or thing which can be made binding hereby for the OWNER and/or ARCHITECT and/or CONSULTANT from either any member or official nor from the OWNER, nor from the ARCHITECT and/or CONSULTANT.

3.12.3 Third Party Insurance

Before commencing the execution of the WORK, CONTRACTOR shall insure with Eastern Federal Insurance Co. Ltd. Or Adamjee Insurance Company Ltd., Duly attested by their Head office against any damage, loss or injury which may occur to any property (including that of OWNER or to any person) including any employee of OWNER and/or ARCHITECT and/or CONSULTANT, by or arising out of the execution of the WORK or Temporary Works or in carrying out of CONTRACT. Such insurance shall be effected with an insurer and at terms approved by OWNER and for at least the amounts stated in Appendix 'A' to the Form of Tender. The CONTRACTOR must, whenever required produce to the OWNER the policy or policies of insurance and receipts for payment of the current premiums.

3.12.4 Accidents or Injuries to Workmen

3.12.4.1 OWNER's and ARCHITECT's Liabilities The OWNER and ARCHITECT and/or CONSULTANT do not assume any liability for damage or compensation as a result of accident or injuries or epidemic illness of workmen or any other person in service of CONTRACTOR or Sub-Contractor. The CONTRACTOR must indemnify and keep indemnified OWNER and ARCHITECT and/or CONSULTANT with regard to all damages and liabilities of this type as well as with respect to any claims, demands, proceedings, damages, cost, charges and expenses there from or in connection therewith.

3.12.4.2 Approved Insurers The CONTRACTOR shall insure against such liability with Eastern Federal Insurance Co.Ltd., Duly attested by EFU Head Office or Adamjee Insurance Company. The insurance is to be maintained by CONTRACTOR during the entire duration of the CONTRACT. CONTRACTOR shall when required, produce to OWNER such policy or policies of insurance and the receipt for payments of the current premiums.

3.12.4.3 Sub-Contractors and Suppliers The insurance of CONTRACTOR must also include the personnel of all Sub-Contractors and suppliers, insofar as they WORK on SITE, so that OWNER and ARCHITECT and/or CONSULTANT are also kept indemnified in this respect.

3.12.4.4 Safety Precautions The insurance obligations under Clause 3.12.4.2 in no case release CONTRACTOR from the obligation to reasonably safeguard conditions at SITE against danger of accident. The CONTRACTOR must therefore take reasonable precautions to guard his personnel who are engaged in the execution of the WORK, as well as third parties, from accidents and physical injuries, as well as from contagious diseases at the SITE. The CONTRACTOR must take steps to see that all sources of danger at the SITE are watched and secured. He must take care that satisfactory and proper lighting conditions exist at the SITE and on all equipment when used for night WORK. All storage and working areas are to be kept clean, in order to avoid the danger of diseases and epidemics.

3.12.4.5 Safety Meetings CONTRACTOR shall convene safety meetings at the SITE not less frequently than once a month which shall be attended by the CONTRACTOR's agent, key construction personnel ARCHITECT and/or OWNER. Should the ARCHITECT and/or OWNER have cause to represent at any such meeting that safety rules and regulations are not being complied with or that unsafe practices are being adopted by the CONTRACTOR, then the CONTRACTOR shall immediately proceed to remedy the situation.

3.12.4.6 Failure to Correct Safety Violations. In the event that the CONTRACTOR fail promptly to remedy the situation and WORK proceeds in the opinion of the ARCHITECT and/or OWNER in a hazardous and dangerous manner then the OWNER upon recommendation of the ARCHITECT and/or CONSULTANT may shut down that WORK and thereafter there will be no resumption of that WORK until the CONTRACTOR makes necessary corrections to bring that WORK in compliance. The CONTRACTOR shall not be entitled to any compensation or extension of time for performance under the CONTRACT in the event the OWNER has to shut down the CONTRACTOR's WORK because of safety violations.

3.12.4.7 First Aid Training A reasonable number of the CONTRACTOR's employees must be trained in First Aid. First aid kits of the type, equip. and number approved by the ARCHITECT and/or OWNER must be furnished properly equipped by the CONTRACTOR, at all construction SITES and working areas. The CONTRACTOR must arrange that each

injured or epidemically ill person is immediately transported to a nearby suitable hospital.

3.12.4.8 Accident Report The CONTRACTOR shall immediately make a written report to the OWNER, ARCHITECT and/or CONSULTANT on all accidents, which result from or in connection with the execution of the WORK, regardless of whether on or near the construction SITE, and which result in injuries, death or damage to property inclusive of all details and statements of witnesses.

3.12.4.9 Payment for Injury or Death The CONTRACTOR is obliged to make payment to his Pakistani workers, staff, their dependents or heirs for any injuries or death which may have occurred to them during the execution of the WORK, in accordance with the provisions of the "WORKMEN'S COMPENSATION ACT 1912" and other laws in the duration of the CONTRACT.

3.12.4.10 Epidemics In case of diseases or plagues of epidemic nature, CONTRACTOR must observe all rules, regulations or instructions issued by the competent authorities charged with the controls, and must in any case take all measures necessary to prevent the spreading of such diseases or plagues among other employed at the SITE.

3.12.4.11 Applicable Government Regulations Nothing under this Clause shall be so interpreted to mean that the CONTRACTOR is relieved from the complete fulfillment of the applicable Government or local rules, directives, laws and instructions in this respect.

3.12.5 Legal Remedy on CONTRACTOR's failure to Insure

If the CONTRACTOR shall fail to effect and keep in force the insurances referred to in Clause 3.12.1 to 3.12.3 hereto, or any other insurance which he may be required to effect under the terms of the CONTRACT, then in any such case, OWNER may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose, and from time to time deduct the amounts so paid by the OWNER as aforesaid from any monies due or which may become due to the CONTRACTOR or recover the same as debt from the CONTRACTOR.

3.13 Performance Bond

3.13.1 General

Before the signing of the CONTRACT, the CONTRACTOR must deposit a **Performance Bond** in the amount of **10 % (ten percent)** of the price of the CONTRACT prevailing at the time

of signing of the Agreement of the CONTRACT for the proper, conscientious and faithful execution of the WORK. This Performance Bond must be given from an approved **Scheduled Bank**; After the final completion and formal acceptance of all parts of the WORK, the Bond sum can be reduced to 5%(five percent) of the price of the CONTRACT applicable at the time of signing of the Agreement of CONTRACT, whereby this reduced Bond is to be made available until the end of the **Period of Maintenance**. It will, thereafter, be released by the OWNER in accordance with the terms otherwise in the Conditions of CONTRACT.

The Performance Bond is binding, irrespective of variations, changes or time extensions, which are granted or agreed upon. It shall be formulated according to the form prescribed in Appendix 'II' to the Conditions of CONTRACT and shall contain the statement, that OWNER can complete that portion of the WORK, which the CONTRACTOR has not commended or not satisfactorily executed, up to the amount of the Performance Bond, at the expense of the insurer or bank giving the guarantee.

3.14 Laws and Regulations

3.14.1 General

CONTRACTOR shall conform in all respects with the provisions of all Federal, Provincial and Local Laws, Rules and Regulations including all regulations and bye-laws of all local or other duly constituted authority within Pakistan which may be applicable to the execution of the WORK, and shall give all notices and pay all fees required to be given or paid thereby and shall indemnify OWNER against all penalties and liabilities incurred by reasons of any such provisions.

3.14.2 Patents, Trademarks, Brand names, etc.

CONTRACTOR shall hold harmless, and indemnify, OWNER and ARCHITECT from and against all claims and proceedings for or on account of infringement by CONTRACTOR of any patent rights, designs, trademarks or brand names, or other protected rights in respect of any constructional plant, machine, WORK, process, or material used for the purpose of, or in connection with the CONTRACT and from and against all claims, demands, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation therewith.

3.14.3 OWNER's Right under Law

Nothing contained in this CONTRACT shall in any way affect or impair, any rights or remedies to which the OWNER may be entitled under law.

3.15 Additions, Alterations, Omissions

3.15.1 General

Variation of the form, quality or quantity of the WORK or any part thereof, can be affected through a written order to the CONTRACTOR signed to show the recommendations of the ARCHITECT and/or CONSULTANT and the authorization of the OWNER. For the purpose, or if it appears desirable to them for any reasons, they shall have the power to issue following binding directives:

3.15.1.1 Quantitative Change to increase or decrease the quantity of any WORK included in the CONTRACT;

3.15.1.2 Omission of any WORK to omit any such WORK;

3.15.1.3 Qualitative Change to change the character or quality or kind or any such WORK;

3.15.1.4 Change in levels and lines to change the levels, lines, positions and dimensions of any part of the WORK; and

3.15.1.5 Additional, Ancillary WORK to execute additional WORK of any kind, in connection with ancillary to the WORK.

3.15.2 No Invalidation of CONTRACT

The CONTRACT and specially the unit rates are not in any way vitiated or invalidated by the aforesaid variations, but the value (if any) of all such variations shall be kept into account in ascertaining the amount of the final price of the CONTRACT and the payments of account hereof.

3.15.3 Variations only on Orders in Writing

No such variation shall be made by the CONTRACTOR without any order in writing of OWNER. However, no order in writing shall be required for increase or decrease in the quantities of any WORK, where such increase or decrease is not the result of an order under this Clause given by the OWNER but is the result of the quantities being less or more than stated in the BOQ's.

3.15.4 Valuation of Variations and Claims

3.15.4.1 Basis of Valuation ARCHITECT and/or OWNER shall determine the amount (if any) which in their opinion should be added to or deducted from the price of CONTRACT, in respect of any extra or additional WORK done or WORK omitted by OWNER's order. All such WORK shall be valued at the unit rates set out in the CONTRACT, if in the opinion of ARCHITECT and/or OWNER, the same shall be applicable. If the CONTRACT shall not contain any unit rates applicable to the extra or additional WORK, then suitable prices and variation orders shall be recommended by ARCHITECT for owner approval. In the event of disagreement, OWNER shall fix such prices as shall in their opinion be reasonable and proper. The rates and prices in Section 5B of the Bill of Quantities shall be deemed to consist of procurement, supply and incorporation of materials in the WORK, including but not limited to the following costs:

Item (1) Material cost FOB Supplier in Pakistan;

Item (2) CONTRACTOR's overheads, risk and profit in connection with the supply as surcharged to (1) above.

Item (3) Insurance, all taxes, import duties and the like.

Item (4) all landings, clearance and transport costs in Pakistan as well as expenditures for handling, storage and incorporation of materials into the permanent WORK at SITE etc., inclusive of all required construction plant and equipment and labour/staff costs, as well as of other SITE overheads, risks and profit.

Item (5) all costs for incorporation of materials into the WORK completed according to Bill of Quantities, Drawings and Specifications. Any material deviating from Specifications and the individual Bill of Quantities must be delivered on instruction of ARCHITECT and/or OWNER, and will be paid for the above cost items as follows under variation order:

Item (1) As per actual costs.

Item (2) With the percentage of (1) above as agreed by OWNER.

Item (3) As per actual costs.

Item (4) As contained in comparable items of the individual Bill of Quantities or if not existing as approved by OWNER.

3.15.4.2 CONTRACT Price Rendered Unreasonable If the pre-requisites under Clause 3.15.4.4 have been fulfilled, i.e., if the total amount of omissions or additions relative to the amount of the whole of the WORK of the CONTRACT shall be such that in the opinion of OWNER the rates or prices contained in the CONTRACT are by reason of such omissions or additions rendered unreasonable or inapplicable then an adjustment of the final price of the CONTRACT without any changes in the unit rates shall be made by the OWNER upon recommendations of the ARCHITECT and/or CONSULTANT considering the prevailing conditions and having regard to the circumstances.

3.15.4.3 Notices Before Change in CONTRACT Price A change in the price of CONTRACT under Clause 3.15.4.1 or an adjustment of the final price of the CONTRACT in accordance with Clause 3.15.4.2 shall only then take place if as soon after the date of signing of the CONTRACT, as is practicable and in the case of extra or additional WORK before the commencement of the WORK or as soon thereafter as in practicable, the following notice shall have been given in writing:

(1) by CONTRACTOR to OWNER through ARCHITECT and/or CONSULTANT of his intention to claim extra payment or an adjustment of the final price of the CONTRACT; or

(2) by OWNER through ARCHITECT and/or CONSULTANT to CONTRACTOR of his intention to issue a variation order as per Clause 3.15.4.1 or to adjust the final price of CONTRACT in accordance with Clause 3.15.4.2.

3.15.4.4 Variation exceeding 20% If the net effect of all variations (other than those arising by reason of any Clause relating to variations in price of materials and/or labour) shall be found on completion of the whole of the WORK to result in a reduction or an addition greater than 20% (twenty percent) of the sum named in the Tender, the amount of CONTRACT Price shall be amended by such sums as shall be agreed upon between ARCHITECT and/or OWNER and CONTRACTOR. In the event of disagreement, OWNER shall fix such sum as shall in his opinion be reasonable and proper consideration being given to all material and relevant factors including CONTRACTOR's own costs and overheads and his decision shall be final and binding to CONTRACTOR.

3.15.4.5 Account of Additional Expenses CONTRACTOR shall send to OWNER through ARCHITECT and/or CONSULTANT once a month an account giving particulars (as

full and detailed as possible) of claims for any additional expense to which CONTRACTOR may consider himself entitled and of all extra and additional WORK which he has executed during the proceeding month. No claims for payment for any such WORK will be considered which has not been included in such particulars. The CONTRACTOR shall not be entitled to demand payment for the period before the claim has been approved by the ARCHITECT and/or OWNER.

3.16 Suspension of WORK

3.16.1 General

CONTRACTOR shall, on the written order of OWNER, suspend the progress of the WORK or any part thereof for such time or times and in such manner as OWNER may consider necessary and shall during such suspension properly protect and secure the WORK so far as is necessary in the opinion of ARCHITECT and/or OWNER or as required under the CONTRACT.

3.16.2 Costs for Suspension

The extra cost including demurrage (if any) incurred by CONTRACTOR in giving effect to OWNER's instructions under this Clause shall be borne and paid by the OWNER unless such suspension is:

- (1) Otherwise provided for in the CONTRACT, or
- (2) Necessary for the proper execution of the WORK for any reason whatsoever or by reason of weather conditions affecting the safety or quality of the WORK, or by some default on WORK, or by some default on the part of CONTRACTOR, or
- (3) Necessary for the safety of the WORK or any part thereof.

3.16.3 Notice to File Claims

A pre-requisite for CONTRACTOR's claim for compensation of additional costs is, that he informs ARCHITECT and/or CONSULTANT in writing, within twenty eight (28) days after receipt of the directive of OWNER, of his intention of file claims. A further pre-requisite is that the claim shall be filed within fourteen (14) calendar days of the written notification to CONTRACTOR by OWNER that the partial or total suspension has been ended. ARCHITECT and/or CONSULTANT will assess and recommend the extra payment (if any) to be made to CONTRACTOR in respect of any claim, which in the opinion of ARCHITECT and/or CONSULTANT is fair and reasonable.

However, final decision will be made by the OWNER which must be accepted by the CONTRACTOR. In the event of CONTRACTOR failing to inform in writing or failing to lodge claim within the stipulated time all of his claims shall be deemed to have been abandoned and extinguished.

3.16.4 Avoidable Costs

In case a suspension of the WORK will result in additional costs for OWNER, CONTRACTOR is obligated to keep these extra costs as low as possible through pertinent arrangements at the SITE. The ARCHITECT and/or OWNER will not accept any additional claims from CONTRACTOR, which could have been avoided with better arrangements.

3.16.5 Suspension Exceeding 45 days

If a particular situation may require after pertinent consideration by OWNER that suspension for a part or the whole of the WORK will extend beyond the consecutive period of twenty (20) days or for a total period of forty five (45) calendar days, OWNER shall have the right to shorten the WORK in accordance with Clause 3.15. OWNER further shall have the right to cancel the CONTRACT in total, or for definite works or parts thereof.

3.16.6 Suspension exceeding 90 Days

If on the written order of OWNER (in this paragraph referred to as a Suspension Order), the progress of the whole WORK shall be suspended for a period or consecutive periods amounting in all to ninety (90) calendar days, or if OWNER having previously issued a Suspension Order for a period which has lasted less than ninety (90) calendar days, shall within less than ninety (90) calendar days from the expiration of that period of Suspension Order issue a further Suspension Order, CONTRACTOR may serve a written notice on OWNER through ARCHITECT and/or CONSULTANT requiring permission within twenty eight (28) calendar days from the receipt thereof to proceed with the WORK or part thereof. If such permission to proceed is not granted within that time, CONTRACTOR, by a further written notice so served, may elect to treat the Suspension where it affects only a part of the WORK as an omission of such part under Clause 3.15 of these Conditions, or where it affects the whole WORK as an abandonment of the CONTRACT by OWNER.

3.16.7 Extension in Completion Date due to Suspension

Suspension of the whole WORK or parts thereof, provided the latter affects the maintaining of the contractual completion date shall entitle the CONTRACTOR to claim an extension of the completion date which extension is to be determined subject recommendation of the ARCHITECT and/or CONSULTANT.

3.17 Date and Time Periods

3.17.1 Date of Commencement of WORK

The date of issue of Letter of Award of WORK by OWNER.

3.17.2 Construction Period

The time allowed for carrying out the WORK as entered in the CONTRACT shall be **18 months** and be reckoned from the date of issue of Letter of Award. The WORK shall throughout the stipulated period of the CONTRACT be processed with all due diligence (time being deemed to be the essence of the CONTRACT).

3.17.3 Extension

If CONTRACTOR shall desire an extension of the time for Completion of WORK on the grounds of his having been unavoidably hindered in its execution for reasons beyond his control he shall apply in writing to OWNER through ARCHITECT and/or CONSULTANT within thirty (30) calendar days of occurrence of the hindrance on account of which he desire such extension as aforesaid and shall, if in his opinion on the certificate of the ARCHITECT and/or CONSULTANT, (Owner's acceptance will be final) deemed that reasonable grounds have been shown thereof, authorize such extension of time, if any, as, in his opinion, be necessary or proper.

3.17.4 "Period of Maintenance"

3.17.4.1 The "Period of Maintenance" shall mean a period of **12 months** as calculated from the date of issue of "Final Certificate of Completion". The WORK shall at, or, as soon as practicable after the expiry of the "Period of Maintenance", be delivered to OWNER to his satisfaction in as good and perfect condition (fair wear and tear excepted) as that in which they were at the commencement of the "Period of Maintenance". The CONTRACTOR shall execute all such WORK or repair, amendment, reconstruction, rectification and making good of defects, imperfections, shrinkage or other fault as may be

required by OWNER and/or ARCHITECT and/or CONSULTANT during the "Period of Maintenance" or within thirty (30) calendar days after its expiration as a result of an inspection made by or on behalf of the OWNER and/or ARCHITECT and/or CONSULTANT prior to its expiry.

3.17.4.2 If, for any material or equipment supplied by CONTRACTOR, the OWNER is entitled to a guarantee or warranty by manufacturer or supplier, the validity of which is greater than 24 (twenty Four) months, CONTRACTOR shall be bound to ensure the realization of all such guarantees or warranties, until the expiry of their validity.

3.18 LEGAL BASES; SETTLEMENT OF DISPUTES; ARBITRATION:

3.18.1 The CONTRACT shall be and be deemed to be a Pakistani CONTRACT and shall accordingly be governed by and construed according to the laws for the time being in force in Pakistan. Should any more Conditions of CONTRACT be lacking in legal effectiveness on account of ambiguity or for any other reason whatsoever the same shall not impair the validity of any other conditions or of the CONTRACT as a whole. Any conflict which cannot be resolved mutually will be referred for arbitration under the arbitration Act. In case of default or conflict the Chairman of Client shall be the Arbitrator and his decision shall be final and binding.

3.18.2 if any or differences of any kind whatsoever shall arise between the ARCHITECT / CONSULTANT and CONTRACTOR in connection with or arising out of the CONTRACT, or the carrying out of the WORK (whether during the progress of the WORK or after the termination, abandonment or breach of the CONTRACT), it shall in the first place be referred to and settled by OWNER who within a period of ninety (90) days after being requested to do so, shall give written notice of his decision to the CONTRACTOR. Such decision in respect of every matter so referred shall be final and binding upon the CONTRACTOR until the completion of the WORK and shall forthwith be given effect to by the CONTRACTOR, who shall proceed with the WORK with all due diligence.

3.19 LEGAL NOTICES

3.19.1 Any notice be given to the CONTRACTOR under the terms of the CONTRACT shall be served, by sending the same to the

CONTRACTOR's Head Office as well as to his local Site Office, by Registered Mail, or to leave it at the Head Office and the local Site Office against receipt.

3.19.2 Any notice to be given to the OWNER and/or ARCHITECT and/or CONSULTANT by the CONTRACTOR is to be sent to him by Registered Mail (as in Clause 3.19.1), or to be left against receipt.

3.19.3 Simultaneously with the sending of notice, as aforesaid, copies thereof shall be dispatched to the CONTRACTOR, the OWNER and ARCHITECT and/or CONSULTANT as the case may be.

3.20 PHOTOGRAPHS

3.20.1 Commencing with the first month, and then continuously each further month until the Completion of the WORK the CONTRACTOR on the direction of the ARCHITECT and/or CONSULTANT shall make colored photographs showing the current progress of the WORK and the completion of each part thereof. He shall use a digital camera, which permits the clean and clear enlargement of the pictures to size 8" x 10" on a single weight glossy paper and supply printed copies along with soft ware. All photographs shall be submitted not later than the 3rd of each month for the period covering the previous month, after prior approval of the photographs by the ARCHITECT and/or OWNER.

3.21 COORDINATION MEETINGS

3.21.1 Shortly after issue of the Letter of Award of the CONTRACT, the ARCHITECT and/or OWNER will require a meeting with the CONTRACTOR at OWNER's office at Karachi, to discuss equipment methodology and scheduling of WORK and other similar matters which may be pertinent for the execution of the WORK. The CONTRACTOR's agent at the SITE, who will be responsible for the execution of the WORK shall be present at this meeting. Meeting for coordination of the progress of the construction WORK will be held at the SITE with the discretion of the ARCHITECT and/or OWNER. When the WORK at the SITE are continuing regularly these meetings will take place once weekly, on the same day and time, at the SITE Office of the Project or whenever required.

3.22 Night, Sunday & Holiday WORK

3.22.1 The CONTRACTOR will be permitted to carry out the WORK also by double or three shifts operation, if he has undertaken to

prove satisfactory working conditions for this operation at the SITE and has received the approval of the OWNER. WORK may only be carried out on Friday and Holidays with special approval of the OWNER and/or the competent authorities as per government rules, when such WORK is unavoidable or absolutely necessary for the saving of life or property or for the safety of WORK, or when other extraordinary circumstances so require.

3A. SPECIAL CONDITIONS OF CONTRACT

(Blank spaces to be filled in by the Tenderer)

Pages 3A-1 to 3A- 3

<u>Subject</u>	<u>Provision</u>
3.A.1 Amount of Bid Bond in shape Of Pay Order/ Demand Draft From a schedule Bank	2% of Contract Value
3.A.2 Amount of Performance Bond In shape of Insurance Bond from an Approved Insurance Company/ or Demand Draft from a Schedule Bank	10% of the Price of the CONTRACT at the time of signing the Agreement of CONTRACT.
3.A.3 Securities for the proposed Performance Bond (state name and address of the proposed Scheduled Banks	1. Name _____ Address _____ _____ _____
3.A.4 Minimum Amount of Third Party Insurance.	As per contract and legal requirements
3.A.5 Proposed Time of Completion of the work.	(18) Eighteen Months
3.A.6 Billing mode	No bill shall be accepted whose value is less then Rs. 5.0 million and not Approved by the Client/ Consultant
3.A.7 Interim payment	As per condition of contract Clause # 3.10.1.1
3.A.8 Amount of Liquidated Damages for late completion, for each calendar day thereof, after the completion date	0.1% per day up to max. of 10% of the Final Contract Price
3A.8.a. Mobilization Advance payment against Guarantee from a schedule bank Agreement of CONTRACT (Performa attached)	10 % (Ten percent) of the total price of the CONTRACT

- 3.A.8.b** Deduction of Mobilization Advance
20 % (ten percent) of the Gross value of the first and subsequent Interim running payments until the Mobilization Advance has been wholly recovered.
- 3.A.9** Percentage of Retention.
Shall be deducted @ 10 % of the value of all running bill.
50% retention money shall be released at substantial completion and **50%** will be paid after the laps of maintenance period.
- 3.A.10** Period of Maintenance
12 Months
- 3.A.11** CONTRACTOR's address for service of notices.

- 3.A.12** OWNER's address for service
Engr. Ubedullah Soomro
Project Director
Sukkur IBA University
Nisar Ahmed Siddiqui Road,
Sukkur
- 3.A. 13** ARCHITECT's address for service of notices.
Habib Fida Ali,
Chartered Architect
4, Choudhry Khaliquzzaman,
Road, Karachi-75530.
- 3.A.14** CONTRACTOR'S rates to be inclusive of all materials required for the work unless specified otherwise in any clause of this document.

**3I. APPENDIX 'I' TO THE CONDITIONS
OF CONTRACT**

pages 1 to 3

Draft of AGREEMENT OF CONTRACT

THIS AGREEMENT is made at Karachi on this day, the _____ of _____
Two Thousand and twenty one

between:

**Sukkur IBA University,
Nisar Ahmed Siddiqui Road, Sukkur**

hereinafter referred to as the "**OWNER**" (which expression shall unless repugnant to the context mean and include their respective successors-in-interest and assigns) of the One Part;

And

hereinafter called the "**CONTRACTOR**" (which expression shall unless repugnant to the context mean and include its successors-in-interest and assigns) of the Other Part;

AND WHEREAS THE CONTRACTOR has already furnished to the **OWNER** a Performance Guarantee for the due fulfillment of the **CONTRACT**.

AND WHEREAS THE OWNER is desirous that certain WORK, viz:

Construction of IBA Community College, Jacobabad, should be carried out and maintained and has accepted a Tender by the **CONTRACTOR** for the supply, installation, execution, completion and maintenance of such WORK for an amount of Rs. _____ (Rupees _____ Only).

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of **CONTRACT** hereinafter referred to.
2. The following documents, which for the purpose of identification have been signed by on behalf of the **CONTRACTOR** and by on behalf of the **OWNER** all of which shall be deemed to form and be read and construed as part of this Agreement, viz:

- (a) The Form of Tender, inclusive of the pertinent Appendices and the Instructions to Tenderer.
 - (b) The Conditions of CONTRACT/Special Conditions of CONTRACT.
 - (c) The Specifications.
 - (d) The Bill of Quantities.
 - (e) The Drawings.
 - (f) The relevant correspondence and other documents, as per Clause 2.1.9 of the Instructions to Tenderers as far as specified in detail in the Annexure to this Agreement of CONTRACT.
3. In consideration of payments to be made by the OWNER to the CONTRACTOR as hereinafter mentioned, the CONTRACTOR hereby covenants with the OWNER to supply, install, execute, complete and maintain the WORK in conformity, in all respects, with the provisions of the CONTRACT.
4. Based upon applications for payment submitted by the CONTRACTOR and certificates of payments issued by the ARCHITECT, the OWNER shall pay the CONTRACTOR in current funds for the performance of the WORK, subject to additions and deductions by variation orders as provided in the CONTRACT Documents, the price of the CONTRACT amounting to Rs._____.
(Rupees _____only) as prescribed in the CONTRACT Documents.
5. That this Agreement shall not stand discharged on account of detention/substitution of any of the existing OWNER by other(s) but shall remain binding on CONTRACTOR and CONTRACTOR shall be liable to the existing OWNER of the PROJECT and/or successors-in-interest or assigns of OWNER.

IN WITNESS WHEREOF, the parties hereto have hereunto set their respective hands and seal on the day and the year first above written.

Signed, sealed and delivered by the OWNER.

Signed by:

OWNER

In the presence of

Signed by:

Signed for and on behalf of the CONTRACTOR

Signed by:

In the presence of

Signed by:

**APPENDIX 'II' TO THE CONDITIONS
OF CONTRACT**
pages 1 to 3

Draft of PERFORMANCE BOND

THIS BOND executed at _____ on this _____ day of _____, by _____ having Registered Office at _____ and is hereinafter called the "Surety" (which expression shall unless repugnant to the context mean and include its successors-in-interest and assigns) of the One Part in favor of: **Sukkur IBA University, Nisar Ahmed Siddiqui Road, Sukkur**, hereinafter referred to as the "OWNER" (which expression shall unless repugnant to the context mean and include their respective successors-in-interest and assigns) of the Other Part:

WHEREAS _____ whose Registered Office is at _____ is carrying on business of _____ (hereinafter called the "CONTRACTOR") by an Agreement which shall be signed between the OWNER of the One Part and the CONTRACTOR of the Other Part (hereinafter called the "CONTRACT") has agreed to carry out the WORK of Construction, completion and maintenance of

Construction of IBA Community College, Jacobabad, in conformity with the provisions of the CONTRACT:

AND WHEREAS one of the Conditions of entering into the CONTRACT is that the CONTRACTOR shall provide to the OWNER a Performance Bond in the sum of Rs. _____ (Rupees _____ only) for the fulfillment of the CONTRACT;

AND WHEREAS _____ Surety has agreed to give to the OWNER this Performance Bond on the terms and conditions mentioned hereinafter;

NOW THEREFORE THIS BOND WITNESSETH:

1. That CONTRACTOR shall duly perform and observe all the terms, provisions, conditions, stipulations and his obligations contained in the CONTRACT according to the true purpose, intent and meaning thereof or as may be determined by OWNER who shall be the sole judge in the matter.
2. In the event of default being committed by the CONTRACTOR of which and/ or OWNER shall be the Sole exclusive judges, we as Surety shall satisfy and discharge within two days after demand all the damages sustained by the OWNER on account of the default of the CONTRACTOR as may be solely and exclusively determined by the OWNER and/ or ARCHITECT without any reference of any nature whatsoever to the CONTRACTOR and without any question whatsoever and whether or not the CONTRACTOR disputes his liability in respect thereof and whether or not any arbitration or Court case is pending in respect of the dispute.
3. That our liability under this Performance Bond shall be up to the amount of: Rs. _____ (Rupees _____ only) and this Bond shall become null and void if the CONTRACTOR has carried out the WORK and also performed his obligations strictly in accordance with the CONTRACT to the full satisfaction of OWNER and/ or ARCHITECT who will be the sole and exclusive judges to determine whether or not CONTRACTOR has carried out the WORK and his obligations in accordance with the CONTRACT.
4. That our liability hereunder shall not be discharged until such time that a release has been granted to us in writing under the signature of the OWNER.
5. That OWNER and ARCHITECT on behalf of the OWNER may, as they think fit, without any reference or notice to us, and without at all obtaining our consent, and without prejudice to this Bond, and without discharging or in any way affecting our liability hereunder, at all times grant time or other indulgence to or accept or make any composition or arrangement with CONTRACTOR and also vary, delete, add to or amend the terms and conditions of the CONTRACT without any notice to us or without obtaining our consent for the same. We further agree that no forbearance or forgiveness on the part of the OWNER and ARCHITECT nor any alteration in the extent or in the nature of the WORK to be supplied, installed, executed,

completed and maintained under the CONTRACT without any information to us or without obtaining our consent, shall discharge our liability hereunder.

6. That payment under this Bond shall be made by us in the name of OWNER and a receipt by said OWNER shall discharge us from our liability to OWNER under this Bond.
7. That any notice or demand under this Bond may be made by the OWNER and may be left at our address mentioned herein or any changed address as may be communicated by us by the OWNER, or the said notice may be sent by post to us addressed as aforesaid and if sent by post it shall be deemed to have been given at the time when it should be delivered in due course of post and including such notice when given by post it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by the OWNER that the envelope was posted shall be conclusive.
8. That this Bond shall not stand discharged on account of detention/substitution of OWNER by other(s) but shall remain binding on us and we shall be liable to OWNER and/or successors-in-interest or assigns of OWNER.

IN WITNESS WHEREOF we have signed and sealed this Bond on the day and the year first above mentioned in the presence of:

(1) _____

(2) _____

**APPENDIX 'III' TO THE CONDITIONS
OF CONTRACT**
pages 1 to 2

Draft of BID BOND

KNOWN ALL MEN BY THESE PRESENTS THAT WE _____

_____ (hereinafter called the "Bank", do hereby bind ourselves and our successors, executors and administrators to pay OWNER namely: **Sukkur IBA University, Nisar Ahmed Siddiqui Road, Sukkur** on the first demand from said OWNER without any question and without reference to _____

_____ (hereinafter called the "Tenderer") and irrespective of any dispute existing between Tenderer and OWNER, the sum of Rs. (Rupees _____ only) in respect of Tender submitted by Tenderer to execute the

Construction of IBA Community College, Jacobabad, to be deposited with OWNER and binding Tenderer to abide by his Tender for a period of (45) days from the _____ (date of opening of the Tender) and if Tender is accepted then to sign the CONTRACT and provide Performance Bond:

NOW THE CONDITIONS of the above written Bond are such that:

1. If Tenderer fails to abide by his Tender for the period mentioned above and if the Tender is accepted by OWNER, then Tenderer fails to sign the CONTRACT and provide Performance Bond, payment of Rs. _____ (Rupees _____ only) will be made immediately a demand is made by the OWNER and/or ARCHITECT on us without any question and without reference to Tenderer and irrespective of any dispute existing between Tenderer and OWNER in respect of the acceptance or rejection of the Tender and irrespective of the pendency of the dispute before any Arbitrator or in Court of Law.
2. That any notice or demand under this Bond may be left at our address mentioned hereinabove or at any changed address as may be communicated by us to the OWNER and/or ARCHITECT in writing against receipt of OWNER and/or ARCHITECT or the notice of demand may be sent to OWNER and/or ARCHITECT to us addressed as aforesaid and if sent by post it shall be delivered in due course of post and including such notice when given by post it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by OWNER and/or ARCHITECT that the envelope was posted shall be conclusive.

3. That this Bond shall not stand discharged on account of deletion, substitution of OWNER by other(s) but shall remain binding on us and we shall be liable to OWNER and/or successors-in-interest or assigns of OWNER.

Signed, sealed and delivered by the said:

in the presence of:

THE COMMON SEAL OF THE BANK WAS HEREUNTO AFFIXED IN THE
PRESENCE OF:

**APPENDIX 'IV' TO THE CONDITIONS
OF CONTRACT**
pages 1 to 3

Draft of MOBILIZATION ADVANCE GUARANTEE

To:

_____,
_____,
_____ ,

Gentlemen:

WHEREAS you have entered into a CONTRACT with _____
_____ hereinafter called the
CONTRACTOR) for the WORK namely,

_____, Construction /
renovation/ Interior Furnishing work at **IBA Community College, Jacobabad**,
AND WHEREAS at our request and at the request of CONTRACTOR you have
agreed to advance to CONTRACTOR a sum of Rs. _____ (Pak Rupees
_____ Only) to be used by the CONTRACTOR for
the procurement and transport of construction/ fabrication and erection plant as
well as of materials for the WORK inclusive of Temporary Works.

NOW THEREFORE we do hereby agree, undertake and guarantee:

1. That the CONTRACTOR shall use the advance amount of Rs. _____
(Pak Rupees _____ Only) for the purpose
of procurement and transport of construction/ fabrication and erection plants
as well as materials for the WORK inclusive of Temporary Works as defined
in CONTRACT dated _____ entered into between you and
CONTRACTOR.
2. The CONTRACTOR shall repay the above said advance to you either by
getting the same deducted from his running bills as per the Conditions of the
CONTRACT or from his own resources.

3. In the event CONTRACTOR failing to utilize the advance for the purpose for which it has been given by you and/ or CONTRACTOR failing to make the payment of the same to you as per the Terms and Conditions of the CONTRACT we hereby guarantee the payment of the amount of Rs. _____ (Pak Rupees _____ Only) or such other amount as may be outstanding against CONTRACTOR within two days after demand any nature whatsoever to CONTRACTOR and irrespective of existence of any dispute between you and CONTRACTOR and irrespective of pendency of any dispute with CONTRACTOR before any Arbitrator or any Court of Law.
4. That a demand certifying that CONTRACTOR has failed to utilized the advance for the purpose for which it has been given and/ or has failed to repay the same and signed by you will be conclusive against CONTRACTOR and against us which certified demand shall not be questioned by us for any reason whatsoever and it would be sufficient authority for us to make the payment to you.
5. That our liability under this guarantee shall stand reduced automatically to the extent of the adjustment made from the running bills of the CONTRACTOR and a certificate signed by you or ARCHITECT, to this effect shall be conclusive and binding on us.
6. That the payment hereunder shall be made by us under this guarantee in your name, and the ARCHITECT's receipt shall be sufficient that the payment has been made to you hereunder.
7. That any notice or demand under this guarantee may be left at our address mentioned hereinafter or at any changed address as may be communicated by us to you in writing against receipt of ARCHITECT to the notice of demand may be sent by post to us addressed as aforesaid and if sent by post is shall be deemed to have been given at the time when it should be delivered in due course of post and including such notice when given by post it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by ARCHITECT that the envelope was posted shall be conclusive.
8. That all notices and demands hereunder may be sent to us by ARCHITECT for the time being which will be as sufficient as if the same has been sent by you.
9. That "ARCHITECT" in this documents means M/s. Habib Fida Ali, Architects, and/ or his successors-in-interest or assigns.

10. That this guarantee shall not stand discharged on account of your deletion/ substitution of by other(s) but shall remain binding on us and we shall be liable to you and/ or your successors-in-interest or assigns.
11. That you shall have collective and/ or several right to recover the full amount under this guarantee from us which shall be paid by us to you as per Clause (6) hereof.

Signed sealed and delivered:

Signed in the presence of:

This _____ day of _____

**CONSTRUCTION OF
SIBA COMMUNITY COLLEGE, JACOBABAD**

**TENDER DOCUMENTS FOR
CIVIL & PLUMBING WORK**

**VOLUME II
SPECIFICATIONS**

**Habib Fida Ali
Architects**
4, Ch. Khaliqzaman Road,
Karachi – 75530
Tel: 92-21-566 1720, 566 1684
Fax: 92-21-568 6891
Email: Info@Habibfidaali.Com
[Www:Habibfidaali.Com](http://Www.Habibfidaali.Com)

Specification for Civil Work

Specification for Electrical Work

Specification for Plumbing Work

Bill of Quantities for Civil Work

Bill of Quantities for Electrical Work

Bill of Quantities for Plumbing Work

4.1 EXCAVATION & EARTHWORKS

pages 4.1-1 to 4.1-10

4.1.1 SCOPE

The works covered by this section of Specifications consist of furnishing all plant, labor, equipment, appliances and materials and in performing all operations in connection with earthworks in accordance with this section of Specifications and the applicable drawings, and subject to the terms and conditions of the CONTRACT.

4.1.2 GENERAL

.1 CONTRACTOR shall acquaint himself with the nature of the ground, existing structures, foundations and sub-soil conditions which might be encountered during the excavation or other earthworks.

.2 The subsoil Investigation Report is available with ARCHITECT and/or for reference. However, ARCHITECT does not guarantee or warrant in any way that the material to be found in the excavation will be similar in nature to that of any samples which may have been exhibited or indicated in the Report, Drawings or in any other part of the CONTRACT or to material obtained from boring or trial holes. CONTRACTOR shall be deemed to have made local and independent inquiries as to, and shall make the whole risk of, the nature of the ground, subsoil or material to be excavated or penetrated and CONTRACTOR shall not be entitled to receive any extra or additional payment nor to be relieved from any of his obligations by reasons of the nature of such ground subsoil or material.

.3 All excavation, cutting, embankments & fill shall be constructed to the lines, levels & gradients specified with any necessary allowance for consolidation, settlement & drainage so that at the end of the Period of Maintenance the grounds shall be at the required lines, levels & gradients. During the course of the CONTRACT & during the Period of Maintenance any damage or defects in cutting and embankments, structures, & other works, caused by slips, falls or wash-ins or any other ground movement due to CONTRACTOR's negligence shall be made good by CONTRACTOR at his own cost.

4.1.3 SITE PREPARATION

.1 CONTRACTOR shall set out the works and shall be responsible for true and perfect setting out of the same and for correctness of the positions, levels, dimensions and alignments of all parts thereof. If at any time any

error in this respect shall appear during the progress of the WORK, CONTRACTOR shall, at his own expenses, rectify such error, to the satisfaction of the ARCHITECT.

- .2 CONTRACTOR shall construct and maintain accurate bench marks so that the Lines and Levels can be easily checked by the ARCHITECT .
- .3 CONTRACTOR shall construct and maintain such ditches, in addition to those shown on the plans, as will adequately drain areas under construction.
- .4 Clearing shall consist of the falling and cutting up, or the trimming of trees and the satisfactory disposal of trees and other vegetation designated for removal, together with downed timber, snags, bushes and rubbish occurring within the areas to be cleared. Trees, other vegetation, stumps, roots and bushes in areas 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 drawings or designated by ARCHITECT . to be left standing. Individual trees, group of trees, and other vegetation, to be left standing shall be thoroughly protected from damage incident to construction operations, by the erection of barriers or by such other means as the circumstances require, as approved by the ARCHITECT. Clearing operations shall be conducted so as to prevent damage by falling trees to trees left standing, to existing structures and installations, and to those under construction, and to provide for the safety of workers.
- .5 Grubbing shall consist of the removal and disposal of all stumps, roots larger than 2" in diameter, and matted roots in the designated grubbing areas. Stumps, roots, logs or other timber larger than 2" in diameter, matted roots and other debris shall be excavated to a depth not less than 2'0" below any sub grade, shoulder or slope, and moved. In areas where cut is over 3'0", grubbing shall not be necessary. In areas to be paved, or in areas indicated on the drawings as future paved areas where excess excavation from grading operations is placed, or in areas designated by ARCHITECT as future paved areas, where excess excavation from grading operations is placed, grubbing will be necessary.
- .6 Timber and other refuse to be disposed of by burning shall be burned at locations designated by the ARCHITECT, in a manner that will avoid all

hazards such as damage to existing structures, construction in progress, trees and vegetation. CONTRACTOR shall be responsible for compliance with all pertinent laws and regulations. Disposal by burning shall be kept under constant attention until the fires have been burned out or extinguished. No materials will be permitted to be pushed or placed on adjacent public or private property without prior written approval of the ARCHITECT.

4.1.4 EXCAVATION:

- .1** Excavation shall include the removal of all material of every name and nature.
- .2** CONTRACTOR shall give reasonable notice of his intention to excavate and submit to ARCHITECT full details of his proposal. ARCHITECT may require modifications to be made if he considers CONTRACTOR's proposal to be unsatisfactory, and CONTRACTOR shall effect such modifications but shall not be relieved of any of his responsibilities with respect to such WORK.
- .3** For major excavations, CONTRACTOR shall submit for the prior approval of ARCHITECT, full details and drawings showing the proposed method of procedure, supporting and strutting, dewatering, and maintenance of adjacent structures. The design, provision, construction, maintenance and removal of such Temporary Works shall be the responsibility of the CONTRACTOR, and all costs in this respect shall be included in the billed rates for the Permanent works.
- .4** CONTRACTOR shall preserve the completed excavation from damage from slips and earth movements, ingress of water from any source whatsoever and deterioration by exposure to the sun and the effect of the weather.
- .5** All excavation of every description in whatever material encountered shall be performed to the elevations and dimensions shown on the drawings in such a manner as to avoid interruption to WORK in other parts of the Site. CONTRACTOR shall be responsible for any injury to the Permanent works caused by excavation in other parts of the WORK.
- .6** Excavation shall extend to sufficient distance from walls and footing to allow for placing and removal of forms, installations of services, and for

inspection, except where it is authorized to deposit concrete for walls and footings directly against excavated surface. This extended Excavation shall not be paid.

- .7 All excavations shall be taken to the levels/elevations as shown on the drawings and shall be trimmed carefully to a smooth & level surface. The CONTRACTOR shall then cover the foundation surface with lean concrete of type & thickness as indicated on the drawings as early as possible, preferably the same day. In case the laying of concrete is delayed by the CONTRACTOR and the level of the excavated foundation is disturbed due to any reason whatsoever, the CONTRACTOR shall trim and level the foundation again at his own cost and any extra depth excavated in this regard shall have to be filled with concrete of class 'E' at his expense.
- .8 No excavation shall be refilled nor any permanent WORK commenced until the foundation has been inspected by the ARCHITECT and/or his representatives' permission to proceed given.
- .9 If excavation for footing are carried out below the required level, as shown in the drawings or as directed by the ARCHITECT, the surplus depth shall be filled in with 1,000 psi concrete at the sole cost of CONTRACTOR.
- .10 All excavation shall be performed in the dry. The placing of blinding concrete, placing of reinforcement and casting of the permanent works in the excavation shall be carried out in the dry and CONTRACTOR shall have sufficient equipment for this purpose. Adequate precautions shall be taken to prevent any erosion from underneath previously constructed adjoining foundations. Any dewatering required for this purpose shall be deemed to be included in CONTRACTOR's rates for this Excavation.
- .11 Shoring, including sheet piling, where required during excavation, shall be installed to protect workmen and the banks, adjacent paving, structures and utilities. The term shoring shall also be deemed to cover whatsoever methods CONTRACTOR elects to adopt, with prior approval of ARCHITECT, for upholding the sides of excavation, and also for planking and strutting the excavation against the side of public roadways and adjoining properties in existing hardcore of any other material. CONTRACTOR will be held responsible for upholding the sides of all excavations and no claim for additional excavation, concrete or other material will be considered in this respect.

- .12 Excavation for deep retaining walls shall be protected from drying out by covering with hessian or other means, if excavation is to stand open for more than 24 hours. This is a precaution to prevent excessive surcharge loads acting on the wall, from the drying out and subsequent swelling of clay soils when saturated either by rain or capillarity of ground water.
- .13 If rock is encountered; it shall be removed carefully and without excessive noise and vibration. Blasting, if required shall be done if allowed, by persons skilled in such WORK and as directed by the ARCHITECT. Necessary permission for blasting should be obtained from respective Government Authorities and the client by CONTRACTOR. All necessary precautions shall be taken to see that the general public and the properties in the vicinity shall not receive any damage by such blasting. Rock to receive footings shall be stepped and levelled.
- .14 Existing utility lines that are shown on the drawings or the locations of which are made known to CONTRACTOR prior to excavation and that are to be retained, as well as utility lines constructed during excavation operations shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the CONTRACTOR at his own expense. Any existing utility lines which are not known to CONTRACTOR in sufficient time to avoid damage, if inadvertently damaged during excavation, shall be repaired by CONTRACTOR and adjustment in payment will be made as approved by the ARCHITECT and/or CONSULTANT. When utility lines which are to be removed, are encountered within the area of operations CONTRACTOR shall notify ARCHITECT in ample time for necessary measures to be taken to prevent interruption of the service.
- .15 Excavated material suitable for use as filling material shall be deposited as directed by the ARCHITECT. Surplus or material unsuitable for use as filling shall be disposed off by the CONTRACTOR to areas approved by relevant authorities for this purpose.

4.1.5 FILLING

- .1 After completion of foundation footings, foundation walls, and other construction below the elevation of the final grades, and prior to filling, forms shall be removed and the excavation shall be cleaned of trash and debris.
- .2 Filling shall be approved selected material from excavation or other

predominantly granular material and free from slurry, mud organic or other unsuitable matter, and capable of compaction by ordinary means.

- .3 Filling in trenches and foundations shall be placed in 6" layers and compacted to optimum moisture content by mechanical means where possible.
- .4 Filling around pipes and cables shall be carefully placed fine sand material to cover the pipe or cable completely before the normal infilling is placed.
- .5 Material for bulk filling shall be as approved by the ARCHITECT and shall be placed in layers of 6" and saturated with sufficient water or otherwise compacted to produce not less than 95% in-situ density with respect to the maximum density, at optimum moisture content, achieved in Test No.12 of BS 1377:1967.
- .6 All filled areas shall be left neat, smooth and well compacted, the top surface consisting of the normal site surface soil, unless directed otherwise
- .7 Filling shall not be placed against foundation walls prior to approval by ARCHITECT. Filling shall be brought up evenly on each side of the walls as far as practicable. Heavy equipment for spreading and compacting the filling shall not be operated closer to the wall than a distance equal to the height of the filling above the top of footing.
- .8 All structures retaining the earthworks shall have a filling of granular material for drainage through the weep holes or rubble drain as shown on the Drawings, or as additionally directed by the ARCHITECT.
This granular material shall consist of:
 - .1 Gravel as used for foundations to specified slope.
 - .2 Mixture of gravel of a maximum size 2".

These shall be placed in layers of the same thickness and at the same time as the placing of fill in the embankment. All gravel, etc., for use in the above drainage mediums shall be free of dirt, chemically inert and well graded so that, when placed and compacted this filling shall be stable.

4.1.6 EMBANKMENT:

- .1** No embankment shall be commenced until the foundations have been approved by the ARCHITECT. When approved as suitable by ARCHITECT, materials arising from the excavations may be used for filling as required. Mud, slurry, organic matter, peat and any other unsuitable material shall not be used for filling for any purpose on the Site. Where suitable materials from the excavations are insufficient for filling, the requirement shall be made up with other granular material, which CONTRACTOR shall obtain from sources approved by the ARCHITECT.
- .2** The quantity of the filling material brought from outside shall be subject to the approval of the ARCHITECT. The ARCHITECT shall require CONTRACTOR to carry out various tests of the filling material. All such tests shall be made at an approved laboratory at the cost of CONTRACTOR. Once a material from a specific source has been approved, the material of the same quality and from that source only shall be used. Any filling material from burrow pits which has not been approved or the quality of which differ from the approved material shall be rejected out of hand. ARCHITECT reserves the right to order removal of any such materials brought to the Site of WORK at his discretion at CONTRACTOR's expense. In order to ensure satisfactory compaction, it will be necessary to carry out, depending upon the type of material, particle size distribution tests, determination of organic contents tests, maximum and minimum density tests and determination of optimum moisture content for the filling material.
- .3** The method of compaction, namely type of roller, weight of roller and number of passes proposed by the CONTRACTOR for any particular filling material shall be subject to the approval of the ARCHITECT after the completion of satisfactory field tests, subsequent to the laboratory analysis, using the materials and equipment proposed to be used for the earthwork in conditions similar to those likely to be encountered during construction. The final selection of the soil moisture content, the thickness of layers, the type of compaction equipment and the number of passes shall be decided after these tests, which shall be conducted at CONTRACTOR's expense.
- .4** Having established the method of compaction to be used, no departure from this approved method shall be permitted without the prior approval of the ARCHITECT. The adequate control of the filling and compacting operations shall be ensured by in-situ density tests and in order to obtain

significant results, not less than two tests shall be carried out per 1000 sft. of area compacted. The frequency of tests shall be determined on site and may be varied at the discretion of ARCHITECT as the WORK proceeds. Tests shall be carried out in accordance with British Standard 1377:1967 or to such other standards as approved by the ARCHITECT. The standard of acceptance of the compaction will not be less than 95% in-situ density with respect to the maximum density, at optimum moisture content, achieved in Test No.12 of BS 1377:1967.

- .5 The exact thickness of layers and the method of placing and compacting the filling shall be determined by the field tests, as stated above but not withstanding the results of these trails, filling shall not be placed in layers exceeding 9" in thickness. The full width of the embankment shall be placed in one operation. In order to maintain control of the thickness of layers, timber profiles shall be used. The CONTRACTOR shall provide adequate supply of water and sufficient capacity of mechanical water carriers to ensure uniform and uninterrupted operation of compaction. The ARCHITECT may forbid CONTRACTOR to proceed with pacing and/or compaction of filling and/or removal and re-compaction of such filling if he finds that CONTRACTOR has insufficient or defective equipment or that the work is improper. If it is found necessary to alter the moisture content of the filling material in any way, then very strict control shall be exercised over the wetting and/or the drying process and frequent moisture content tests shall be made.
- .6 Where directed, earth slopes shall be protected with handset stone pitching, either dry or in mortar as specified. Pitching stones shall be approved rock rubble. (with no extra payment)

4.1.7 METHOD OF MEASUREMENT OF EARTHWORKS:

- .1 Unless otherwise specifically stated in the Bill of Quantities, or herein, all items shall be deemed to be inclusive of, but not limited to, the following:
 - .1 Labor and all costs in connection therewith.
 - .2 Materials, goods and all costs in connection therewith (e.g. conveyance, delivery; unloading; storing; returning packing; handling; hoisting; lowering).
 - .3 Setting out of WORK.

- .4 Cost of all laboratory and field tests stipulated in these Specifications.
 - .5 Use of Plant.
 - .6 Waste of materials.
 - .7 Establishment charges, overhead charges and profit.
 - .8 All other expenses, royalties, charges and taxes specified in Conditions of CONTRACT.
- .2 Quantities of excavation, earthwork, embankments, etc. shall be calculated from level taken by CONTRACTOR and agreed by the ARCHITECT before commencement of the WORK.
- .3 Site Preparation:**
- .1 The cost of Site preparation shall be included in cost of excavation.
- .4 Excavation:**
- .1 The quantities given for excavating and subsequent disposal shall be deemed to be the bulk before excavating. Addition will be allowed for permissible side slope, if shown on drawings.
 - .2 The unit price for excavation shall be deemed to include the following also:
 - Getting out excavated materials by any means necessary and subsequent disposal of excavated material to any lift and lead.
 - Keeping excavations free from water, from any source whatsoever, and providing pumps and other equipment, power attendance for pumping and standing time.
 - Shoring which shall mean providing everything requisite to uphold the sides of excavation by whatever means are necessary.
 - Placing and compacting of backfilling in the excavations to the required degree and elevations as stipulated in the Drawings and as directed by the ARCHITECT.

- .3 CONTRACTOR shall place the blinding concrete layers so as to completely cover the area of the base excavated by him, but he shall be paid on the basis of dimensions of the over-site concrete area as shown on the Drawings.

.5 Embankment:

- .1 Quantities for embankment shall be deemed to be the net volume of the embankment after being placed and compacted to the required degree and elevation as stipulated in the Drawings and as additionally directed by the ARCHITECT.
- .2 Treating the surface of the embankment, filling (e.g., leveling, grading to falls, grading to chambers) shall be deemed to be included in the unit price of embankment.
- .3 Trimming the sides of embankments to slope shall be deemed to be included in the unit price of embankment.

4.2 PLAIN AND REINFORCEMENT CONCRETE

Page 4.2.1 to 4.2.44

GENERAL

1. CONTENTS

The various parts of these Specifications pertaining to the Civil Construction Works have been grouped as follows:

1. General
2. Clearing & Grubbing
3. Excavation for Structures
4. Concrete
5. Formwork
6. Steel Reinforcement
7. Structural Steel
8. Piling
9. Quality Control and Testing Site Facilities

These Specifications shall be an integral and essential part of the Contract for this Project and no deviations of any kind, no matter how minor or apparently minor, shall be allowed without the prior approval of the Engineer in writing. No deviations of any kind shall be considered under any circumstances prior to the execution of the Contract. After the Contract is executed, and/or in the course of execution of the Works, the Engineer shall, from time to time and as circumstances may warrant, consider deviations which may be proposed by the Contractor in the light of conditions as may then exist and, provided that such deviations are not in any way prejudicial to safety during construction or the safety, permanency, finish and/or appearance of the Works or of any parts thereof, the Engineer may approve such deviations, provided however, that all such approvals shall be in writing and provided that this provision or any other provision or provisions in these Specifications and/or in any other part or parts of the documents constituting the complete Contract shall not in any way limit, diminish or affect the power of the Engineer to enforce the Specifications at his sole discretion to safeguard safety during construction and/or the safety, permanency, finish and/or appearance of the Works and of any parts thereof by any means he sees fit.

2. POWER OF THE ENGINEER

The Engineer also reserves the right to amend the Specifications and/or to issue supplementary Specifications at his sole discretion at any time and for any reason relating to safety during construction and the safety, permanency, finish and/or appearance of the Works or of any parts thereof and/or relating to commonly accepted standards of good engineering practice particularly, but without limiting the generality of this provision, when such amendments and/or the supplementary Specifications are made necessary by the construction methods and procedures adopted by the Contractor, by the equipment provided by the Contractor and/or by the Contractor's performance of the Work, and such amendments and/or such supplementary specifications shall be in all respects equally binding upon the Contractor as the original Specifications and the Contractor shall not vary for this reason any prices quoted by him for this work.

The Engineer may also, but only at the request of the Contractor, advise and/or whenever possible, assist the Contractor in the technical aspects only of the work and particularly on methods and procedures complying with and/or facilitating compliance with the Specifications provided, however, that such advice and/or assistance shall not in any manner or degree and/or under any circumstances diminish or affect the Contractor's undivided responsibility for executing all works in compliance with the Specifications and with the commonly accepted standards of good engineering practice and to the complete satisfaction of the Engineer. The Engineer will be held indemnified of any responsibility for any damage or loss to the Contractor or to the third Party as the result of advisories mentioned herein.

3. MATERIALS

All materials provided by the Contractor for use in the permanent works constructed under this Contract shall be new and unused and meet the approval of Engineer who may ask for the testing Reports of manufactures and also ask for the Physical Tests to be carried out in the presence of his Representative by the Contractor at his cost. Second hand materials or materials of unknown origin shall not be used unless specifically permitted by the Engineer in writing.

4. SPECIFICATIONS & TESTING PROCEDURES

As described in Table of Frequency in "Testing of Material". The materials to be used are referenced to specifications and testing procedures of either the American Association of State Highway & Transportation Official (AASHTO) or the American Society for Testing and Materials (ASTM) or British Standard Specification (BSS) described in their latest editions where samples of materials are to be taken for laboratory tests and approvals, the methods to be utilized are fully described in these references and shall be followed unless directed otherwise, in writing, by the Engineer. Reference should be made to Quality Control and Testing requirement described in Specification No. 8.

All materials, which do not conform to the requirements of these Specifications, will be rejected whether in place or not. They shall be removed immediately from the site of the work at Contractor's expense.

5. APPROVAL OF SOURCES AND TYPES OF MATERIAL AND PLANT

The sources of material, quarries or mills shall be selected and representative samples submitted to the Engineer for testing by the Contractor in the presence of his Representative from approved Laboratory prior to use in the Works. No material will be used which is not secured from a source approved by the Engineer. Approval of a source does not mean that all material in that source is approved and the Engineer may ask from time to time use the alternate source. The rejected materials at any time and change of source will not affect the Item Rates in BOQ of this Contract.

Moreover, the Contractor shall, before placing any order for materials, manufactured articles and machinery for incorporation in the Works, submit for the approval of the Engineer the names of the firms from whom they propose to obtain such materials etc. together with a list of the materials,

manufactured articles and machinery which he proposes that the firms should supply, and no materials, manufactured articles or machinery shall be ordered or obtained from any firm which the Engineers has not previously approved in writing.

Particular attention is drawn to the quality of Form Works and Shuttering. All the Formwork shall be of steel face to give unblemished smooth fare face to the concrete face without pitting, pock marks, wobble, blemish or honeycombs on the concrete surface.

6. SUPPLY OF COPIES OF STANDARDS

The Contractor shall keep a copy of all Standards referred to in the respective clauses of the Specifications at site for reference purpose;

7. HINDRANCE / SAFETY

Whenever the Contractor's operations create hazardous condition to operation and hindrance to other Contractors at site or to the public, he shall furnish, erect, and maintain, at his own cost and expense, such fences, barricades, lights, signs and other devices as are necessary to prevent accidents or damage or injury to the public or damage to the other's plants, tools and facilities. The Contractor shall also furnish such flagmen and guards as are necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered.

CLEARING AND GRUBBING

1. SCOPE

This Specification is for Contractor to prepare site for the construction of permanent and temporary works. While all possible efforts have been made by the Employer to clear the site of bushes and site does not have sudden deeps high hillocks and cliffs. Contractor will provide at his own cost the access tracks for their vehicle and movements where excavation for leveling the ground is required for the purpose of construction of permanent works to reach the lines and levels of the structural component foundation and required plinth level or ground level. This excavation/ leveling will be included for measurement and payment as specified in Specification No. 3 "Excavation for Structures". Contractor will maintain at his own cost proper access tracks; water it regularly to control the dust due to vehicle movement. All the site facilities, labor, accommodations will be provided by the Contractor at his own cost.

2. REQUIREMENTS FOR CLEARING, GRUBBING & STRIPPING

2.1 General

Clearing and grubbing and stripping shall be carried out in:

- all areas where excavation will be done in the right of way.
- all areas where structures will be constructed.

2.2 Clearing and Grubbing

Except in areas to be excavated, stump holes and other holes ditches from which obstructions are removed shall be back-filled with suitable material and

compacted in accordance with specifications of backfilling.

Materials and debris which cannot be burnt and perishable materials may be disposed off by methods and at locations approved by the Engineer, on or off the project. If disposal is by burying, the cover material shall provide a cover of at least 300 mm and shall be graded and shaped to present a pleasing appearance. If the disposal location is off the project, the Contractor shall make all necessary arrangements with property owners in writing for obtaining suitable disposal locations which are outside the limits of view from the project. The cost involved shall be included in the unit bid price.

2.3 Boulder

All loose Boulders lying on the surface of the ground shall be removed and placed in neat pile inside the right-of-way.

CONCRETE

1. SCOPE

These Specifications relate to concrete in all parts of the Works. Work included in these Specifications consists of Contractor providing all plant, labor, curing, equipment, work platforms, gangways appliances and materials and performing all operation in connection with the supply of plain and reinforce concretes complete in accordance with these Specifications and Drawings subject to the Contract.

2. CONCRETE BATCHING AND MIXING

It is clarified that concrete batching, weighing and mixing for all structural concrete components will be fully Mechanized Batching Plant of minimum capacity of 25 cm/hr.

No hand mixing or mixing by mobile rotary mixing machines, manual hopper scale batching or weighing or transport and dumping of materials by trolleys will be allowed under any circumstances.

3. EMBEDDED ITEMS/ ANCHORAGE POCKETS

- a) Full co-ordination and Engineer's inspection will be required by the Contractor to identify and to install embedded items provide pockets, holes, trenches, tunnels and conduits in the concrete components before the commencement of concrete.
- b) Suitable instructions will be provided for setting items not placed in the forms. Embedded items shall have been inspected, and tests for concrete and other material or for mechanical operations shall have been completed and approved, before concrete is placed.
- c) For special concrete finishes and for special methods of construction (e.g. slip form, formwork, shop drawings shall be designed and prepared by the CONTRACTOR at his own cost. Approval of shop drawings as well as that of actual samples of finished concrete shall be obtained before WORK is commenced.

4. MATERIALS

4.1 Cement

- a) Concrete shall be made from ordinary Portland cement complying with BS-12 unless otherwise clearly stated. If any Sulphate Resisting (SR) cement is required to be used, it shall conform to BS- 4027 and the component of Structures where SR Cement is to be used shall be clearly marked in the Description of Items in BOQ or on Drawings.
- b) Manufacturing source (Mills/Brand) of cement shall meet the approval of Engineer and no equivalent type of cement or alternate source or Brand or manufacturer other than specified and approved by the Engineer shall be permitted for any Work, temporary, or permanent at the Site. Only one brand of each type of cements shall be used for concrete in any individual member of the structure.
- c) The quantity of cement in stock at the site shall be maintained in such a manner as to ensure continuity of work on the one hand and to avoid deterioration of cement with age. If the cement has been in storage for more than eight weeks at site, then samples of such cement in stock shall be subject to tests in a testing laboratory as directed by the Engineer. Such cement shall be accepted for use in the works only after the **brickette** tests show compliance with BS-12. Cement containing lumps, in hardened bags due to moisture absorption or high stack compression in store, or has become stale and lost its usefulness for concrete in the opinion of Engineer it shall not be used in any part of the Works and shall be removed from the Site at Contractor's cost and expense. All samples shall be labeled for identification with the corresponding stocks.
- d) Contractor shall store the cement in a weather-proof shed with a wooden or other elevated floor or platform raised not less than 150 mm above the ground. Storage space must be sufficient to allow separate storage of separate consignments of cement to permit access to each and all separate consignments. Cement bags stacked in open and covered by tarpaulin sheets during night as mean of protection from elements will not be permitted.
- e) Cement shall be delivered in paper bags. The supply of cement in bulk is permissible provided the bulk transport and storage facilities are such that cement is protected from deterioration in bulk transport and/or storage. Bulk cement shall not be permitted to be dumped in open beans covered by waterproof sheets as protection.
- f) The use of cement at site shall generally follow the sequence of delivery and receipts of shipments and used within reasonable time. There shall be sufficient cement at sites of Contractor's WORKS to ensure that each section of WORK is completed without interruption. If the cement is supplied by THE OWNER, the CONTRACTOR shall inform Engineer of his requirement of cement much before its use in construction. Requisition for Cement shall state the Components/Structures of WORKS and approximate volume of concrete expected to be consumed by those Components/ Structures during 15 days periods.
- g) The Cements residue from used up bags will not be used for concrete. Mixing of different Brands or Types of cement shall not be permitted.

4.2 Aggregates

- a) The aggregates shall comply with the requirement of BS-882. The source/quarries of all fine and coarse aggregates shall be subjected to the approval of the Engineer.

The Contractor will conduct the required Testing stipulated in Specification No. 4 & 9 (**Concrete & Quality Control Testing and Site Facilities**) in reputable Laboratory witnessed by Engineer' Representative prior to Engineer's Approval and transporting to Site. The coarse aggregates shall be screened and graded to the required size. The maximum size of aggregates for all classes of concrete as defined herein below shall be stipulated in the drawings and where not so stated shall be subjected to the condition that the ratio of the least dimension of the structural member to the maximum size of aggregate to be used in concrete for that member shall not be less than 5. The maximum size of the aggregate shall be 5 mm less than the clear distance between the bars not more than 40 mm in any case.

- b) All fine and coarse aggregates shall be clean and free from clay, loam, silt, and other deleterious matter. If required, PM reserves the right to have them washed by the CONTRACTOR at no additional expenses. Coarse and fine aggregates shall be delivered and stored separately at SITE. Aggregates shall not be stored on muddy ground or where they are likely to become dirty or contaminated. The Alkali/Aggregate Reaction Test and Deleterious Substance Tests to conform AASHTO-T80 are imperative for fine and coarse aggregates before meeting Engineer's approval.
- c) Fine aggregate shall be hard coarse sand, crushed stone or gravel screenings and shall conform to requirements of ASTM C-33. The fine aggregate (Sand) source/quarry should be either **Bholari/Ranpathani** or from quarries in the vicinity of **Nooriabad** subject to the satisfactory gradation laboratory tests conforming ASTM C-33 or equivalent BSS in the presence of Engineer's Representative.
- d) Coarse aggregate shall be gray broken/crushed gravels from **Hub River Bed** near Karachi and should be hard, durable material free from laminated structure and conforming to ASTM C-33.
- i) For use in mass concrete such as in foundations Course aggregates shall be graded as per AASHTO T27 or BSS Tabulated below:

Table No. 1

TOTAL PASSING	PERCENT BY WEIGHT
➤ 2" B.S Sieve (50.00 mm)	100
➤ 1-1/2" Sieve (38.10 mm)	95 – 100
➤ 3/4" Sieve (19.00 mm)	35 – 70
➤ 3/8" Sieve (9.50 mm)	10 – 30
➤ No. 4 Sieve (4.75 mm)	0 – 5

- ii) Coarse aggregate for all cast-in-place concrete other than mass concrete and thick fair faced cast-in-place concrete shall be graded with the following limits:

Table No. 2

TOTAL PASSING	PERCENT BY WEIGHT
➤ 1" Sieve (25.00 mm)	100

➤ 3/4" Sieve (19.00 mm)	90 – 100
➤ 3/8" Sieve (9.50 mm)	20 – 55
➤ No. 4 Sieve (4.75 mm)	0 – 10

- iii) Coarse aggregate or thin fair faced cast-in-place concrete shall be graded as follows:

Table No. 3

TOTAL PASSING	PERCENT BY WEIGHT
➤ 1/2" Sieve (12.50 mm)	50
➤ 3/8" Sieve (9.50 mm)	85 – 100
➤ No. 4 Sieve (4.75 mm)	10 – 30

- e) All aggregates shall be stored in such a manner as to avoid their contamination by matter harmful to the quality of concrete to be manufactured from them.
- f) The aggregates should be preferably kept in storage bins for a day to drain the moisture. If the excessive moisture is observed either from the quarry or heavy dew overnight or due to light rain, the aggregates should be spread out or ladled over for moisture to evaporate specially for morning concrete operation. In case of aggregates laced with such visual moisture which may effect the water cement ratio fixed (W/C) during Trial Mix Design Stage by using dry Aggregates, Moisture content in aggregates should be immediately determined in Site Laboratory and the Contractor shall inform the Engineer of lowering water content in the concrete mix at batching plant to keep the W/C fixed for Trial Mix unchanged. Concreting with soaked aggregates due to rain will not be permitted.
- g) The grading of fine and coarse aggregates shall be analyzed as specified in Specification Nos. 4 & 8 to ensure that the grading is uniform and is the same as that of the samples used in the preliminary tests on the basis of which the mix proportions have been approved by the Engineer.

4.3 Water

All water used for concrete shall comply with BS-3148 "Tests for water for making concrete".

Clean and clear water which does not have sweet, saline or brackish taste to be used for mixing and curing of concrete. Where doubt exists, the strength of mortar sample made with questionable water is compared with mortar sample produced with acceptable water (like distilled water). The questionable water may be accepted if the sample yield concrete strength of at least 95% of the other sample made with acceptable water.

Water containments under no circumstance shall be greater than following limits:

- Oil 000 ppm

- Chlorides 1,000 ppm
- Sulphates 1,000 ppm
- Turbidity 2,000 ppm
- Acids 10,000 ppm
- Potassium and NaOH 0.5 to 1.0% by weight of cement.
- Seawater shall not be used for any concrete works or curing.

4.4 Admixtures

Concrete admixtures may not be used without permission in writing from the Engineer. Should the Contractor required to use admixtures he is to provide full evidence in support of the suitability of the admixture proposed as per BS-5075. The Contractor shall carry out all tests and trials as the Engineer may require and consider necessary as evidence chemical soundness tests.

5. CONCRETE

The quality and types of concrete in various parts of the works is stipulated on the Drawings and described in BOQ on the basis of the required minimum characteristic cube strength as per BSCP-8110 as follows:

Table No. 5.1

Structural/ Non-Structural Components	Nominal Mix by Volume *	Min. Cement Contents (Kg/ Cu. M) **	Max. Water Cement Ratio (W/C)***	Min. Works Cube Characteristics Strength at 28 Day Maturity ****	
				N/Sq. mm	Lbs/ Sq in
Lean Concrete.	1 : 4 : 8	160	0.68	-	-
Non Structure Concrete.	1 : 3 : 6	200	0.60	10	1,450
Piles.	Mix Designed (1 : 1½ : 3)	400	0.45	26	3,750
Pile Cap, Foundation, Footings, Sub Structures.	Mix Designed (1 : 2 : 4)	300	0.55	21	3,000
Piers, Column Shafts, Beams, Walls, Slabs Super Structures.	Mix Designed (1 : 1½ : 3)	320	0.55	26	3,750
Silo Walls	Mix Designed (1 : 1½ : 3)	350	0.55	35	4,750
Special Structures Mentioned on Drawings.	Mix Designed (1 : 1 : 2)	500	0.50	42	6,000

* Nominal mix ratio is only for the guidance. Minimum cement content and mix design for the required characteristic cube strength will be mandatory. Design

mix prepared under laboratory condition will show crushing strength 20% above the required works cube strength of the field concrete. Except for the pile concrete which will be designed for 1.43 time the work cube strengths.

- ** To increase the workability of the concrete Engineer's approved plasticizer/ admixture may be used after determining the quantity at design Mix stage.
 - *** The proportion in which various ingredients shall be determined must satisfy the strength requirement and stipulated finishes shall be subject to the conditions that any mix shall not use less than 300 kg of cement per cubic meter of concrete. Water cement ratio shall not exceed 0.55 for sub structure and super structure concrete. Even if Design Mixes or Work Mixes show higher than required strengths, the nominal Cement Aggregate Ratios and Minimum Quantity of Cement and W/C ratios will be mandatory unless adjusted by the approval of Engineer based on mix design consistency.
 - **** On Specifications and Drawings at some places cylinder strength are mentioned. These should be read as Cube Strengths.
-

5.1 Concrete Mix Design

- a) The Contractor shall design suitable mixes for concrete from the materials he proposes to use. The Contractor shall prepare at least three trial mixes for each type. The procedure used shall be as that given in Road Note No.4 on the design of concrete mixes published by the Building Research Establishment of Britain or equivalent alternative procedure to satisfy the requirements of "Specification No.8 - Concrete: Materials, Specifications and Constructions" BS-8110. The object of the grading and the mix design shall be to achieve a mix corresponding to medium workability. The relevant data of trial mixes shall be submitted to the Engineer along-with the samples of the aggregates, details of sources of all materials and results of tests performed on the constituent materials. Alternatively the Mixtures having proportions suitable for WORK shall be made base on ACI-211.1 using at least three different water cement ratios and slump fixed with the mix design.

The concrete in pile shall be dense and well compacted to achieve impermeability. In order to ensure easy flow of concrete through the tremie pipe the workability of concrete shall be responding to a slump of 150 mm to 200 mm. The content of cement shall not be less than 400 kg/m³ of concrete. In designing the concrete mix for piles, mean design strength of the mix shall be 1.43 times the stipulated 28 days works cube strength. Suitable retarder - plasticizer be added to reduce setting time and increase workability as approved by the Engineer. In no case water cement ratio of the pile concrete shall exceed 0.45. For achieving workability and required slump Contractor shall carry out sample mixing and test samples before commencement of the piling concrete. The plasticizer/ retarder will meet the approval of Engineer.

- b) **Water – Cement (W/C) Ratios and Slump:** Unless otherwise permitted or specified, the concrete shall be proportioned and produced to have a slump at concreting site not exceeding 90 mm. The Test for Slump for Portland Cement Concrete (ASTM C-143) will govern the slump procedure. For each Water-Cement Ratio (W/C) and Cement-Aggregate Ratios (i.e. proportions) the compression test for cylinder/cube shall be made, cured and tested in accordance with ASTM C-39 or BS-1881. In no case W/C Ratio will be allowed to exceed that specified in the Table 5.1 above.

5.2 Control Cube Tests

- a) **Sampling:** In order to maintain strict control of concrete quality throughout the works, control tests shall be carried out at the cost of Contractor whenever the concrete is prepared. These control tests shall include determination of moisture content in aggregates, sieve analysis and slump test and/or compacting factor tests and works cube testing as per BS-1881. Samples of concrete shall be taken at the mixer for making the works cubes.

A sample of concrete shall be taken at random on two separate occasions during each of the first ten days of using a particular mix. Thereafter, at least one routine sample shall be taken for every 5 cum. of concrete of any type cast on any day for every separate portion of the work. The number of samples per day and the times at which they are taken shall be varied at random. Six (6) cubes shall be made from each sample of which three (3) shall be tested after 7 days and three (3) at 28 days. Test cubes shall be stored at a place free from vibrations and covered with wet Hessian cloth for the first day. Thereafter, the cubes shall be cured in water tanks at Site Laboratory as prescribed in BS-1881. A set of 40 consecutive control cube tests from separate batches results at 28 days shall be employed to determine the level of control. Routine sampling shall not preclude the right of the Engineer to direct additional samples to be taken at any time during casting concrete.

The standard of acceptance of concrete of a particular strength shall be that none of the strengths of test cubes is below 85% the specified 28 days cube strength and the average strength of 4 consecutive cubes is not less than the specified characteristic strength plus 7.50 N/sq.mm.

b) Adequacy of Mix:

- i) In case of Concrete mix, the appropriate strength requirement shall be considered to be satisfied if none of the strengths of the specimen is below the specified strength or if the average strength of the three specimens is not less than the specified strength and the difference between the greatest and least strengths is not more than 20% of that average. ACI-318 Criteria for additional confirmatory testing of Concrete samples/cores will be followed in case the limits given in these paragraphs are not satisfied.
- ii) When the results of tests show that the strength of any concrete is below the minimum specified, Engineer may give instructions for the whole or part of the work concerned to be removed and be replaced at the expense of Contractor. Contractor shall bear the cost of any other part of his, or any other of his sub-Contractor's work, which has to be removed and replaced as a result of the defective concrete.

6. CONCRETING AND BATCHING

- a) No concreting operations of any kind shall be allowed without the prior written permission of the Engineer and shall be valid for concreting operations done on the particular day. The Engineer shall give such permission (Pour Slips) to the Contractor after satisfying himself that the formworks, scaffolding reinforcement and other fixtures to be embedded in the concrete are satisfactory and fixed in accordance with the drawings, that the contractor has sufficient materials, equipment and personnel at

the site of the works to enable him to complete each scheduled operation on time and without stoppages or mishaps. The Engineer may withhold or withdraw such permission and prohibit concreting operation whenever these conditions do not exist or have ceased to exist. It will be the responsibility of the Contractor to request and ensure the final inspection by the Engineer or his representative prior to commencing the concrete operation and also ensure that no concreting operation right from the Batching Plant to the pouring and vibrating/compacting at site goes unsupervised and be under the intimation of the Engineer.

- b) In all concrete, cement including cement supplied in bulk, if any, shall be batched by weight in Mechanical Batching Plant (min capacity 25CM/hr). Aggregates shall also be batched by weight, due allowance being made for water content. Where the batching plant is of the type where the aggregates and cements are weighed in the same compartments the cement shall be weighed between Coarse Aggregates and Fine Aggregates loads. Weigh-batching equipment shall be checked once a week and adjusted as necessary. The weigh-batching device may either be a part of the Batching Plant. The scale of the weigh-batcher shall be so graduated that material can be weighed within a tolerance of $\pm 0.4\%$. The value of the maximum graduation on the scale shall not be greater than 1Kg. Cement handling, weighing and batching apparatus shall be protected from the weather.

No hand mixing or mobile mixers will be permitted for concrete mixing.

7. MIXING

Mixing shall continue for the period recommended by the mixer manufacturer or until there is apparently a uniform distribution of the materials and the mass is uniform in color, whichever period is longer provided always, that the mixing period shall not be less than 1.5 minutes in any case. The gauging mechanism should be capable of being locked on any predetermined setting. Addition of water by hand to the mixer directly is prohibited

The concrete shall be discharged from the mixer directly in to **transit mixers** using mechanical or crane operated skips or hopper for intermediate storage. Whenever a mixer and/or hopper have been out of use for 20 minutes or longer they shall be thoroughly cleaned and washed before any fresh concrete is mixed, and the first batch of concrete to be mixed thereafter shall have a cement content enriched by 10% (ten percent) in comparison to the standard mix in use.

The skip and the throat of the drum shall be kept free of accumulations. Mixing blades will be replaced when they have lost 10% of their original weight. Each batch shall be so charged into the drum that some water will enter in advance of cement and aggregates and water shall continue to flow into the drum at least 5 seconds after all cement and aggregates are in the drum.

8. TRANSPORTING

The concrete shall be transported from the place of mixing to the place of final deposit as rapidly as practicable by means which will prevent segregation or loss or addition of ingredients. Transit mixers are mandatory for transporting the concrete from the Batching Plant to Pour site. The

Contractors will use concrete pumps for rapid placing of the concrete. For transporting/placing concrete by pumping, the Contractor shall give his proposal in details including the pertinent mix design of concrete to the Engineer for approval before the commencement of the works. The pumps should be checked and maintained daily concrete shall be deposited as nearly as practicable in its final position so as to avoid re-handling or flowing. Head pans shall not be used for transporting concrete.

Any Concrete after mixing and leaving the Batching mixer stays un-poured either in the Transit Mixer or in open without placing and compacting at the structural component for more than 40 minutes, or Engineer determined that the un-deposited concrete has lost its plasticity, shows semi dry consistency or is partially hardened to adopt reasonable flow capacity whichever event is earlier, it will be rejected and removed from the site out of hand. No attempt to pour additional water in the un-poured concrete mix will be permitted

9. PLACING

- a) The concrete shall be placed as soon after it has been mixed as is practicable. Once the concrete has left the Batching Plant mixer no more water shall be added, although the concrete may be remixed or agitated in the Transit Mixer to help maintain workability. The concrete shall not be used if through any cause the workability of the mix at the time of placing is too low for it to be compacted and to an acceptable finish by whatever means are available.
- b) The time between mixing and placing shall be restricted to 40 minutes when the ambient temperature is not more than 35° centigrade. This time shall be reduced if the work is carried out at higher temperature of exposed to a drying atmosphere.
- c) In casting horizontal areas the width of the strip being cast at a time shall be proportioned to the rate of casting in such a manner that no free edges are left for a period of time exceeding 40 minutes. Edges which must be left for more than 40 minutes shall be treated as proper construction joints with all the appropriate precautions. Any such unscheduled joints that occur owing to mixer break-down or for some other reason shall be cut back to locations of scheduled construction joints to a sound vertical face and treated as proper construction joints.
- d) Before placing of concrete, formwork shall have been completed, water shall have been removed, reinforcement shall have been secured in place, expansion joint material, anchors, and other embedded items shall have been kept in position, and the entire preparation shall have been approved.
- e) No concrete is to be placed into the foundation trenches until the ground to receive the same has been examined and approved by the Engineer for this purpose.
- f) The actual sequence of construction proposed by CONTRACTOR shall be subject to Engineer's approval before construction starts on any part of the structure, and this sequence shall not be varied without Engineer's prior approval.
- g) The concrete shall be deposited as nearly as possible in its final position to avoid re-handling. In no circumstances may concrete be made to flow along the forms by the use of vibrators. Concreting shall be carried out on

as a continuous operation using methods which shall prevent separation or loss of ingredients.

- h) The free fall of concrete shall not be allowed to exceed eight feet and where it is necessary for the concrete to be lowered more than this amount, it is not to be dropped into its final position, but it is to be placed through pipe, or chute, the lower end of which shall be kept in, or close to the freshly deposited concrete. The dia. of the pipe shall be not less than 6 times the maximum size of aggregate
- i) For mass concrete, and concrete in thick foundations or large or deep component of structure components example-shafts, walls, deep beams concrete shall be placed in layers approximately 18" (450 mm) thick. Vibrator heads shall extend into the previously placed layer. Once vibrated concrete will not be allowed to be vibrated again/
- j) The workmen carrying concrete to the SITE, and all other workmen moving about before during the concrete placement shall move only along runways or planks placed over the forms and gangways planks placed clear off the reinforcement meshes.

10. CONSTRUCTION JOINTS

- a) Location of construction joints shown on the drawings or issued by the Engineer at site are mandatory.
- b) Vertical construction joints shall be made against properly constructed stop ends firmly fixed and with holes where necessary to pass reinforcement. The methods of forming construction joints shall be those shown on the drawings, unless an alternative detail is agreed to with the Engineer in writing.
- c) Stop ends shall be carefully removed without disturbing the reinforcement and other fixtures; 24 hours after placing of concrete is completed and all construction joints are to be wire brushed within 24 to 30 hours, in order to expose and roughen the surface, and then shall be hosed down with clean water without loosening the aggregate particles in concrete. Immediately prior to casting concrete against a construction joint the previously cast and roughened surface shall be thoroughly cleaned, moistened with clean water and flushed with a 1:3 cement grout. Special care must be taken to ensure that the new concrete is thoroughly compacted against the construction joint surface. Construction joints in members shall be located as shown on the Drawings or as approved by the Engineer before casting the relevant works.
- d) Joints not shown on the Drawings shall be so made and located as to least impair the strength of the structure and shall need prior approval of PM. In general, they shall be located near the middle of the spans of slabs and beams unless a secondary beam intersects a main beam at this point, in which case the joint in the main beam shall be offset to a distance equal to twice the width of the secondary beam. Joints in walls and columns shall be at the underside of floors slab or beams, and at the top of footings. Beams, brackets, columns, capitals, haunches and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

- e) All reinforcing steel shall be continued across joints. Key and inclined dowels shall be provided as directed by PM. Longitudinal keys at least 40 mm deep shall be provided in all joints in walls and between walls and slab or footings.
- f) When the work is to be resumed on a surface which has hardened, such surface shall be roughened in an approved manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface.
- g) The hardened concrete of construction joints and of joints between footings and walls or columns, between walls or columns and beams or floors they support, joints in un-exposed walls and all others not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete.
- h) The hardened concrete of joints in exposed work. joints in the middle of beams, and slabs and joints in work designed to contain liquids shall be dampened (but not saturated) and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surface and at least 1/2" (12 mm) thick on horizontal surface. The fresh concrete shall be placed before the grout has attained its initial set.
- i) Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or **bristle** brush. Care being taken to avoid dislodging of particles of aggregate. The surface shall then be coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm in thickness, and shall be well rammed against old work, particular attention being paid to corners and close spots.
- j) Stop ends for movement joints or construction joints shall be made by splitting them along the lines of reinforcement or the concrete. Stop ends made of expanded metal or similar material may only be left permanently in the concrete with prior written approval of Engineer. Where such stop ends are used, no metal may be left permanently in the concrete closer to the surface of the concrete than the specified cover to the reinforcement. Wood strips inserted for architectural treatment shall be kerbed to permit swelling without pressure on the concrete.

11. EXPANSION JOINTS

Pre-molded expansion joint filler shall be approved bitumen impregnated fiberboard.

12. EMBEDDED ITEMS/ANCHORAGES/ POCKETS

Contractor will ensure that all the embedded items for Mechanical or Structural Steel components/ structures, pockets for machine foundations and anchorages, recesses, trenches. conduits and sleeves for cables and pipes, water stops, are as per drawings and sketches formally issued by the Engineer and their placement checked and approved by Engineer's Representative. These embedment, forms for trenches vertical and horizontal sleeves and recesses shall be firmly tied to the reinforcing bars by other additional holding devices so as to retain their required positions during the frenzy of concreting. The opening for hollow conduits and sleeves and

embedment will be temporarily stuff at their opening by removable packing material to avert the concrete going in side. As the concrete progresses, Contractor's Supervisor/surveyor shall recheck the correct position of embedment and make adjustment while the concrete is still green.

13. COMPACTING

- a) All concrete shall be compacted by only mechanical vibrators of not less than 1200 cycles per second frequency and no other form of compaction shall be used except in respect of the concrete in members requiring under-water concreting. Types and number of vibrators at concrete site shall be approved by the Engineer before concreting. At least 4 vibrators in operative condition shall be available for concreting. Should vibrators break-down in the course of a concreting operation, the concreting shall not be carried out and the concrete shall be finished upto the location of the last scheduled construction joint.

The use of external vibrators is permissible provided the form-work is accordingly designed. However, at locations where internal immersion type vibrators can be used without disturbing reinforcement and fixtures, the diameter of the needle shall be at least 3/8 inch (10 mm) less than the space available to pass the vibrator.

- b) Vibrators shall be inserted and withdrawn at points approximately 18" apart (450 mm). At each insertion, the duration shall be sufficient to cause consolidation, generally from 5 to 15 sec. A spare vibrator shall be kept on the SITE during all concreting operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process supplemented if necessary by spading to work the coarse aggregate back from the formed surface.
- c) If there is any tendency for the mix to segregate during consolidation, particularly if this produces excessive laitance, the mix proportions shall be modified to affect an improvement in the quality of the concrete to the satisfaction of Engineer and in conformity with the provisions of Clause-6.
- d) Vibrators shall not be allowed to contact the formwork for exposed concrete surface.
- e) Mechanical vibrators shall be of a type suited in the opinion of Engineer to the particular conditions.
- f) Over-vibration or vibration of very wet mix is harmful and should be avoided.

14. CURING OF CONCRETE

- a) The concrete shall be round the clock wet cured for a period of 12 days + 2 days drying period, or as if stipulated on the drawings. All exposed concrete surfaces and steel plate side forms shall be completely wrapped in thick jute cloth or similar materials and this wrapping must be kept in a permanently wet state throughout the day and night for not less than 12 days after casting. In addition it is strongly mandatory that when substantial areas of slabs or mass concrete exposed surfaces are cast, these areas should be partitioned off by means of temporary partitions of sand two hours after casting and that these areas be flooded with water without removing the Hessian cloth sheets or sand covering the concrete. Simple sprinkling of exposed concrete surface by hand or by sprinkler

devices is specifically prohibited. The use of curing compound to replace moist curing stipulated above as a general rule is prohibited. In specific locations the curing compound may be permitted by the Engineer provided the ambient temperature is less than 24° centigrade and the relative humidity is above 30% and should conform to ASTM-309 requirements.

The exposed surfaces of the foundation concrete should not be backfilled till 14 days during period is completed.

- b) All the side steel form plates shall be covered as drape-sheds to ward off direct heat and kept moist round the clock for 36 hours after concreting. After the removal side plates/forms the exposed surface will be wrapped by Hessian sheets and kept continuously moist for 12 days.

15. WORK IN ADVERSE WEATHER

In cold weather no concreting shall be allowed when the temperature falls below 10° centigrade.

No concreting shall be allowed in rainy or showery weather. The Engineer may withhold permission to concrete if he has reason to assume from the meteorological report that there are chances of rain on that day.

The premature or "flash" or setting of concrete "slump loss" or cold joints are encountered on very hot days (38° C) may be carefully watched particularly if concreting operations are carried out between 11 a.m. and 4 p.m. in the sun in summer. When the ambient temperature is above 35° centigrade the concrete shall be made using ice for cold water so that the temperature of the concrete at the mixer is not more than 35° centigrade. Aggregates and cement shall be protected from the sun and steel forms and reinforcement bars should be sprayed with water before the placement of concrete. The mixer shall be placed under shade and transit mixers will be preferably painted white. After casting, the concrete shall be protected so that its temperature is kept below 35° centigrade during the first 24 hours. The Engineer shall enforce relevant provisions of "Recommended Practice for Hot Weather Concreting" of the American Concrete Institute (ACI).

16. SURFACE FINISHES

All the concrete components above ground shall be fair faced with steel forms. There are two types of surface finishes required as shown on the drawings, generally fair-faced surface shall be achieved on all visible surfaces above ground.

Smooth Fairface Surface:	A smooth concrete surface without off-sets, joint marks board marks, abrasion or unaesthetic pocks marks, blemishes or cement bleed deposits or honey combs. Any unevenness and wobble shall be more than 3 mm in 3 meters surface area. This surface is required for all exposed concrete surfaces and shall not be allowed receive any plaster or repair unless permitted by the Engineer. In such event smooth rubbed finish shall be produced on newly hardened not later than a day following Form removal. The blemished surface will be wetted and rubbed with
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	carborandum brick or other abrasive until uniform color and texture are produced. Cement mortar paint like paste 1:2 mortar with W/C not exceeding 0.45 will be applied rubbed till smooth consistency in surface and color is achieved by experienced mason.
Ordinary Surface:	A concrete surface not exposed above the ground should be without off-sets, cement overflow bleeding deposits and unevenness of more than 3 mm in 3 meters but with board/ joint marks are acceptable. The surface texture should not have pock marks or honeycombs, and should accept, if required, application of plaster or other stipulated repair finish without resort to making any key, excessive chiseling or chipping.
Other Finish:	All the horizontal surface of the concrete not covered by Formworks will be rough trowel finish or smooth travel finish as instructed by Engineer.

Finishing of concrete surfaces if allowed at post-concreting stage shall be performed in the presence of the Engineer or his subordinate staff. Concrete surfaces shall be tested by the Engineer or by his subordinate staff, where necessary, to determine surface irregularities. Surface irregularities are classified as abrupt or gradual. Offset caused by displaced or misplaced form-work will be considered as abrupt irregularity and will be tested by direct measurements. Concrete surface shall be free from these irregularities. All other irregularities shall be considered as gradual irregularities and shall be tested by use of a 2 meter long straight edge template. The surface shall not show gradual irregularities of more than 3 mm in 3 meters length.

Upon removal of the form-work, blemishes, segregation, patches, surface irregularities and voids, if any, shall not be washed or filled until inspected by the Engineer and then shall be treated according to his instructions. No coating or plastering shall be allowed under any circumstances unless specifically instructed by the Engineer after inspection of defects as stated above, and any unauthorized coating, plastering or other attempts to conceal defects of any kind shall lead to the rejection of all such work by the Engineer out of hand without recourse.

Components not complying with smooth fare finish requirement will be pulled down and redone at contractor's risk and cost at the instruction of Engineer.

17. MEASUREMENT AND UNIT PRICES

Measurement for payment for concrete shall be of the net volume of concrete placed in the Works and measured as per finished concrete lines and levels shown on the drawings. If measuring any small hollow recess, sleeve and embedment (not the trenches) having cross sectional area of each such void less than 0.01 SM and measuring less than 0.03CM of un-concreted void volume will not be deducted.

Payment for concrete shall be made at the unit prices per volumetric unit Quoted for the appropriate item and types, described by nominal cement: aggregate ratios and Strength in the Bill of Quantities. The unit prices quoted in BOQ shall include the cost of supplying all materials, mixing, supply, fabrication and fixing of form-work, placing concrete, compaction, removal of

form-work, curing and finishing including all plant, operations, procedures and requirements necessary to complete this work, as per drawings, these Specifications, Contract Conditions and as additionally directed by the Engineer.

FORMWORK

This Section of the Specification applies to the supply, transport, store, protect, clean before and after use, erect and secure during and after concreting, provide structurally adequate scaffolding, shoring, bracings, ties and bridging, bolting and propping, making stable foundation for the scaffolding, yolks, battens and other falseworks, providing gangways and platforms required for concreting below ground at any height, providing safety nets and railings for the workers and arrange safe inspection access to the Engineer's Supervisory staff, all inclusive and old required material, labor and equipment for the Formworks, re-propping and re-shoring after concreting for the Concreting any Structures of any shape and configuration at Site, except for Silos

1. MATERIAL, QUALITY, WORKMANSHIP AND SAFETY

- a) All form-work shall be of only of steel plates and all concrete above ground level will be fair face. Details of all form-work and the supporting system shall be submitted by the Contractor to the Engineer for approval. All supporting evidence, calculations etc., for such details required by the Engineer shall be provided along-with the details. Work will not to be commenced before such approval is given for the particular form work details.

All form-work shall be fabricated from steel plates of a minimum thickness of 3 mm trimmed straight and at return corners and cross braced by steel angle irons and X braces at back. Timber or steel-clad timber form-work shall not be allowed. Timber or steel-clad form-work, may, however be used in foundations, rafts below ground level and not exposed to the view after completion.

Quality of previously used plates shall be inspected and approved by the Engineer and they shall not be re-used if there is any evidence of surface wear and tear or defect that would impair the quality of the surface. Forms shall be thoroughly cleaned and properly coated before re-use and scaffolding pipes and couplers will be approved by the Engineer and if the Engineer finds pitting, wobbles, warped out of shape, rusted or fatigued used formwork plates or excessively worn scaffolding pipes and couplers, Contractor will remove them from wok area and shall not use them.

- b) All form-work and shuttering shall be fully capable of supporting all the loads due to the fresh concrete and due to construction equipment and operations, including vibration. These loads and impacts shall be carried without any deformation or deflections that will result in the dimensions of the concrete member distort beyond the tolerances stipulated in the drawings or herein the Specifications. If no tolerances in line level and surface finish are specified, Contractor will ensure that the dimensions of the finished concrete conform to the lines and levels and surface shown the drawings.

The requirement of finished surfaces of exposed concrete is stipulated in Specification No. 4 "**CONCRETE**" in these specifications.

- c) All details of form-work and the supporting systems shall be submitted along-with calculations and estimate of loads etc., to the Engineer who shall approve and/or amend the same, provided however the approval of the form-work shuttering and supporting system by the Engineer shall not in any way affect or diminish the contractor's undivided responsibility for the fully satisfactory performance and stability of this work and producing the fare face finish of the exposed concrete.
- d) All joints between form-work steel panels shall designed and fabricated be flush and tight smudged without gaps when bolted to one another at edges. No packing between the form-plates exceeding 1.5 mm cut from new soft but non absorbing packing material will be allowed for filling any local gaps. Internal ties shall be used as little as possible and shall, whenever unavoidable, be in steel located at such positions which will not disturb the reinforcement. The use of spacer blocks for the reinforcement shall be prohibited whenever the same effect can be achieved by properly dimensioned spacer rings mounted directly on the reinforcement. All spacer blocks and rings shall be of the same strength as the concrete in which they are embedded and shall be adequately cured before use.
- e) Where the shape of finished concrete has angular or slopping edges, Contractor will use smaller steel panels or steel panels fabricated to shape to avoid excessive overlaps or protrusions of larger plates ate such corners. The packing against leaking or bleeding of concrete at corners and edges or slopping surfaces will be guarded by fabricating special plate pieces at such spots.

Prior to placing concrete, all forms and embalmment void ends shall be inspected and all debris and extraneous matter removed by high pressure compressor blower or vacuum and embedment' and openings' hollow open ends should be closed by stuffing removable packing. The form oil or release agent shall not react with concrete to affect the strength or leave stains on the finished concrete surface. The form surface oil if applied will be in such a manner as not to contaminate the reinforcement and other fixtures to be embedded in concrete.

- f) The formwork may be designed so that soffits of slabs and sides of beams, columns, and wall may be removed first leaving the forms to the soffits of beams and their supports in position.
- g) Positive means, wedges or jacks of accurate adjustment and proper removal of shores and struts shall be provided and all settlement shall be taken up during placing of concrete. Forms shall also be securely braced against lateral deflections.
- h) Where concreting of narrow members is required to be carried out within formwork of considerable depth, temporary openings in the sides of the formwork shall be provided where necessary to facilitate the placing and consolidation of the concrete. Small temporary openings shall be provided at the bottom of the formwork to columns, walls and deep beams to permit the cleaning out of debris and observations immediately before concrete is deposited.
- i) Form ties and battens shall be constructed so that the ends or end fasteners can be removed without causing appreciable **spalling** at the faces of the concrete. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less

than twice the diameter or twice the minimum dimension of the tie from the formed faces of concrete to be permanently exposed to view except that in no case shall this distance be less than 19 mm when the formed face of the concrete is not to be permanently exposed to view, form tie may be cut off flush with the formed surfaces. Through bolts shall be permitted provided that they are greased to allow for easy withdrawal and the holes subsequently made good. Through bolts are not to be used on water-retaining structures.

- j) All construction joints, contact surface of the form sheathing for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by not more than 25 mm. The forms shall be held against the hardened concrete to prevent offsets or loss of mortar at the construction joint and to maintain a true surface.
- k) Temporary stop ends at construction joints shall be fully constructed to fit neatly around all projecting reinforcement and fixtures and the joints shall be carefully packed to prevent loss of grout from the concrete.
- m) The form-work of the cast-in-place reinforced concrete work shall be removed subject to the following limitation:

Description	Cold Weather	Normal Weather
➤ Vertical form-work to column and walls and large beams	48 hours	24 hours
➤ Soffit form-work to slabs without removing Props	10 days	7 days
➤ Props to slabs	21 days	14 days
➤ Soffit form-work and Props to beams	28 days	21 days

- n) Cold-weather is defined when the atmospheric ambient temperature is between 5° centigrade to 16° centigrade and normal weather is when the atmospheric ambient temperature remains above 16° centigrade and below 38 centigrade. All form-work shall be removed without shock or vibration which might damage the concrete. Before the side-forms are removed, the concrete surface shall be exposed, where necessary, to ascertain that the concrete has sufficiently hardened.

2. PROPPING AND RE-SHORING

- a) When re-shoring or re-propping of structural component after concreting is requires and permitted, the operations shall be planned in advance and shall be subject to approval by Engineer. While re-shoring is underway no live load shall be permitted on the new construction. In no case during re-shoring shall concrete in beams, slab, columns or any other structural member be subject to combined dead and construction loads in excess of the load permitted by Engineer for the developed concrete strength at the time of re-shoring. Re-shores shall be placed simultaneously with stripping operations are but in no case later than the end of working day on which stripping occurs.

Re-shores shall be tightened to carry their required loads without over stressing the concrete. Re-shores shall remain in place at least until

representative tests of the concrete being supported have reached the 80% Strength and 12 days have elapsed whichever is earlier

Floors supporting props or shores under newly placed concrete shall have their original supporting props or shores left in place or shall be re-shored. The re-shoring system shall have a capacity sufficient to resist the anticipated loads and in all cases have a capacity equal to at least one half of capacity of the shoring system above. The re-shores shall be located directly under a shore position above unless other locations are permitted.

The re-shoring or re-propping shall extend over a sufficient number of story to distribute the weight of newly placed concrete, forms, and construction live loads in such a manner that the design superimposed load of the floors supporting shores or props are not exceeded.

No loads, other than those permitted by the Engineer in connection with the actual work in hand, shall be allowed on suspended floors until 28 days after concreting where ordinary Portland cement is used and 14 days when rapid hardening Portland cement is used.

3. CAMBER

It is required to give forms for reinforced concrete an upward camber to ensure that the beams or slabs including cantilever slabs or beams do not have sag when they have taken up their deflection under full load. Camber, unless indicated otherwise on drawings, should be about $L/240$ for supported beams and slabs and $L/180$ for cantilevers.

4. MEASUREMENT AND UNIT PRICES

- a) Payment of Formworks for Concreting shall be included in the BOQ items of concrete as specified and shall not be considered as separate measured Items for separate payment.
- b) Following shall be deemed to be inclusive over and above but not limited the above specified requirements:
 - Battens, struts, reversed cut strings, bolting, oiling, wedging, shimming, easing, striking off an re-shoring, removal of forms and making surfaces, all yoke, scaffold pipes, wales, sheathing, ties, spacer blocks, jack rods, jacking and adjusting false work scaffolds, bracings.
 - Forming chamfers.
 - Temporary stop ends at construction joints will not be included in measurements or paid as extra.

STEEL REINFORCEMENT

1. SCOPE

The Specifications in this section pertain to the supply, cutting, bending, placing and binding of the reinforcement as shown on the drawings, as detailed in the bar bending schedules in accordance with the specifications contained herein.

2. MATERIAL AND ORIGIN

- a) All reinforcement bars to be used on this project shall be rolled from prime

grade billets (Pakistan Steel or approved equivalent). Reinforcement rolled from scrap steel, ship plate, rails or re-rolled billets shall not be used. All bar reinforcement shall conform to deformed billet steel bars (Grades 40 & 60) for concrete reinforcement conforming to ASTM-615.

- b) The Contractor shall provide test certificates in respect to the Origin of Manufacture and Material having been rolled from Prime Billets for of each batch of reinforcement supplied at the Site of the Works in accordance with ASTM 615 Standards and shall arrange to have retests carried out on samples selected by the Engineer from reinforcement supplied at Site. The cost of all such retests shall be borne by the Contractor. Tests will be carried out in accordance with Specification No. 8.
- c) If the Steel Reinforcement Bars are supplied by the Owner/Employer, the Contractor shall submit the properly formatted Requisition to the Engineer giving the detail of requirements supported by Bar Bending Schedules of components of structure, probable date of concreting. Such Requisitions should be given to the Engineers at least 15 days in advance of scheduled requirement for cutting and bending. The Requisition for bulk supply of all the structural components simultaneously will not be entertained by the Engineer. Contractor will Schedule his Requisitions to conform the Progress Schedule he has submitted for the Contract. In case the Reinforcing Bars are Owner supplied, the Engineer will abide by the requirements and record keeping of the Material Supply and Testing described in Sub-para b) above. The cost of Testing of Steel bars will be borne by the Owner/Client.
- d) The uncut or bent reinforcing bars will be supplied by the Owner from his designated Storage area on site. The delivery to the Contractor will be by weight on the Weighing/Measuring Device at Store. The weight delivered to the contractor for any requisitioned diameter of bars will be to the nearest ton rounded off and will be recorded for deduction from Contractor's Bills. Wastage or damage will be on contractors. Contractor will arrange at his own cost and means transport the bars from Owner's storage area to the locations of his works. The Owner is responsible for supply of steel bars from his storage and further transporting cutting bending and fixing in place operation are shall be the responsibility of the Contractor.
- e) The Contractor shall report immediately to the Engineer on or after the delivery and receipt of the consignment of any deviation in standard weights of reinforcing bars with respect to the diameters shown on the Drawings.

3. STORAGE

Reinforcement shall be free of all dirt, oil, mill scale, concrete or mortar before concreting operations start. It shall be stored on racks clear of the ground and shall be supported sufficiently frequently to prevent permanent bending of the bars whilst stacked. The Contractor will also follow the same precaution of storage at his respective work sites.

4. BENDING, FIXING AND PLACING

- a) Contractor shall arrange for Reinforcement to be accurately bent to the sizes and shapes shown on the bar bending schedules by means of mechanical tools and equipment adequate for this purpose and capable of consistently producing the results required. No manual cutting, hammering and bending by will be permitted at site Standard hooks and bends shall be

in accordance with British Standard Specifications B.S.4466 - "Bending Dimensions and Scheduling of Reinforcement for Concrete" or ACI or CRSI latest version. **Shop drawings and Bar Bending Schedules shall be prepared by the Contractor and submitted to the Engineer for review and record only at least 15 days prior to submitting any Requisition for Steel bars.**

- b) Contractor shall arrange to haul place and fix all reinforcement accurately and securely fixed and tied in place by means of 16 **swg** black annealed steel wire as shown on the drawings, great care being taken to accurately maintain the cover specified. Spacer blocks or preferably rings shall be made of compatible quality concrete, specifically for this purpose, using 10 mm maximum size aggregate. Under no circumstances will the use of broken concrete, mortar, stone, brick, or other similar materials be permitted as spacers.
- c) When all the reinforcement for a particular casting of concrete has been fixed and tied, the Engineer shall be given adequate notice to inspect it. Concreting shall not start until permission has been given by the Engineer. If any fixture such as bolt, etc., is to be built into concrete, it shall be secure in its correct position before casting the concrete member.
- d) Reinforcement is to be accurately placed as shown in the Drawings, and secured against displacement by using 18-20 gauge black annealed wire ties or suitable slips at intersections and supported from the formwork by using concrete, metal or plastic chairs and spacers or hangers of an approved pattern. Where concrete blocks are used for ensuring the cover they shall be made of mortar not leaner than 1 part of cement to 2 parts of sand. Where the concrete surface will be exposed to the weather in the finished structure the portions of all accessories in contact with the formwork shall be galvanized or shall be made of plastic.
- e) Bars used for concrete reinforcement shall be fabricated in accordance with the dimensions shown in the Bending Schedules.
- f) The cutting tolerance for all bars shall be $\pm 1"$ (± 25 mm)
- g) Where an overall or an internal dimension of a bent bar is specified in the schedule, the bending tolerance, unless otherwise stated, shall be as in Table-1.

TABLE-1: BENDING TOLERANCES

DIMENSIONS OF BENT BARS				TOLERANCE			
Over		Up to and Including		Plus		Minus	
	mm		mm		mm		mm
-	-		900		3		6
	900		1800		6		12
	1800		-		12		25

- h) Bars shall be placed to the following tolerances:

i.	Concrete cover to formed surface	6 mm
ii.	Minimum spacing between bars	6 mm
iii.	Top bars in slabs and beams:	

	➤ Members 200 mm deep or less	6 mm
	➤ Members more than 200 mm but not over 600 mm deep	12 mm
	➤ Members more than 600 mm deep	± 25 mm
iv.	Crosswise of members	Spaced evenly within 25 mm
v.	Lengthwise of members	± 50 mm

- i) Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, resulting arrangement of bars shall be subject to approval of the PM/Consultant.
- j) Vertical bars in column shall be offset at least one bar diameter at lapped splices. To ensure proper placement, templates shall be furnished for all columns dowels.
- k) Reinforcement shall not be bent or straightened in a manner that will injure the material. No bars shall be bent twice in the same place, nor shall they be straightened after bending.

Unless permitted by the Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete. Bars which depend for their strength on cold working shall not be heated for any reason (except for welding) Reinforcement larger than 1-1/2" (38 mm) in dia may be bent by the use of heat al (not exceeding 1550° F). Bars bent shall not be cooled by quenching.

- l) No splice of reinforcement shall be made except as shown on the working drawings.
- m) Welding shall be permitted for bars only under suitable conditions and with suitable safeguards in accordance with BS-693. 1856, or AWS D-12.1, provided the type of reinforcement bars have the required welding properties. Tack welding may be used to fix in position bars that cross each other, only with prior approval of the PM.
- n) Exposed reinforcement intended for bonding with future extensions is to be effectively protected from corrosion. Protection is also to be provided to reinforcement partly built into concrete exposed part to be built into later concrete.
- o) No concreting is to be carried out until the reinforcement has been checked and approved by the Engineer.

5. LAPS

The position of various laps in the bars and their length has been stipulated in the drawings. However, when it becomes necessary to lap reinforcement at places not shown on the drawings, the position of such laps shall be subject to the approval of the Engineer. The length of such laps shall not be less than 48 bar diameters. In all cases ACI 318 specified lap lengths will prevail.

6. MEASUREMENT AND UNIT PRICES

- a) Steel Bars: With Reference to the Item Rates quoted by the Contractor, the Steel Reinforcing Bars for the use in the permanent structures/components at the Site according to Contract.
- b) Wastage, losses, damage will be at Contractor's cost and risk.
- c) Rate quoted for Steel by the Contractor in the BOQ will be all inclusive and no payment shall be allowed or to be paid as extra or additional for: binding wires, chairs, spacer blocks, contingency additional ties or rods, labor and plant cost, transporting, cleaning, hauling cutting bending or fixing or preparation of shop drawings.
- d) Payment for the Tonnage for Cutting Bending, fixing mentioned in Item Rates will be as per Bending Schedules prepared and submitted by the Contractor to the Engineer and for the Quantities worked out in Bending Schedules.
- e) Bending Schedule will shall not include wastage, chairs or ties etc, **except** that the quantities of those chairs/support bars which are required to hold the top and bottom meshes foundation rafts slabs having thickness exceeding 750 mm will be paid for. These special high chairs to be shown in Bending Schedules will be spaced at 1.3 m c/c both directions to support upper mesh of raft reinforcement. The diameter of these chair bars will not exceed 16mm.

PILING

1. DESCRIPTION

This work shall consist of performing all operations in connection with furnishing, driving, cutting off and load testing of piles to obtain the specified bearing value complete in place and strictly in accordance with these Specifications and as shown on the Drawings.

The Contractor shall furnish the precast piles in accordance with an itemized list, which will be provided by the Engineer, showing the number and lengths of all piles. When cast-in-place concrete piles are specified on the Drawings, the Engineer will not furnish the Contractor, an itemized list showing the number and length of piles. When test piles and load tests are required in conformance with sub-items 2.7 , the data obtained from such test loads will be used in conjunction with other available subsoil information to determine the number and lengths of piles to be furnished. The Engineer will not prepare the itemized list of piles for any portion of the foundation area until all loading tests representative of that portion have been completed.

The contractor shall provide an outline of his proposed method for constructing large diameter pile when submitting his tender; the proposed method of boring being stated.

Not less than two weeks before the contractor proposes to commence piling, detailed proposal for the piling shall be delivered to the Engineer. These proposals shall include full details of materials, equipment and method to be used in the construction of piles.

If it is proposed to use bentonite slurry, this shall also be described.

Work on piling shall not commence until the contractor's proposals have been approved by the Engineer and communicated to the contractor.

The requirements herein are minimum. Strict compliance with these requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to ensure the successful completion of the work.

The kind and type of piles shall be as shown on the Drawings and/or as specified. No alternate types or kinds of piling shall be used, except with the written approval of the Engineer each time.

2. CONSTRUCTION REQUIREMENTS

2.1 Cast-in-Place Piles

Piles, cast-in-place, shall consist of one of the types either shown on the drawing and/or as specified. The term shaft wherever used in this section, shall mean either piles or shafts.

a. Working Drawings

At least 4 weeks before work on shafts is to begin, the Contractor shall submit to the Engineer for review and approval, an installation plan for the construction of drilled shafts. The submittal shall include the following:

- i. List of proposed equipment to be used including cranes, drills, augers, bailing buckets, final cleaning equipment, desanding equipment, slurry pumps, sampling equipment, tremies or concrete pumps, casing etc.
- ii. Details of overall construction operation sequence and the sequence of shaft construction in bents or groups.
- iii. Details of shaft excavation methods.
- iv. When slurry is required, details of the method proposed to mix, circulate and desand slurry.
- v. Details of methods to clean the shaft excavation.
- vi. Details of reinforcement placement including support and centralization methods.
- vii. Details of concrete placement, curing and protection.
- viii. Details of any required load tests.
- ix. Other information shown on the plans or requested by the Engineer.

The Contractor shall not start the construction of drilled shafts for which working drawings are required until such drawings have been approved by the Engineer. Such approval will not relieve the Contractor of responsibility for results obtained by use of these drawings or any of his other responsibilities under the contract.

b. Fabrication of Permanent Lining

If shown on the drawings, the contractor shall provide a permanent

lining suitably formed of ten (10) mm minimum thickness mild steel plate complying with B.S. 4360. The plates shall be cut and rolled to the inner diameter not less than the nominal diameter of the pile or such larger diameter as to allow the requisite pile diameter hole in the unlined length of pile. The rolled plates shall be connected by full penetration butt welds generally complying with B.S. 5133. No more than three (3) longitudinal seam welds shall be employed in any one cross-section and such welds shall be staggered in position in the cross-section between one length and the next. The dimensional accuracy of the lining shall be as stated on the drawings.

In the case of steel shells or pipes, after being driven and prior to placing reinforcing steel and concrete therein, the steel shells or pipes shall be examined for collapse or reduced diameter at any point. Any shell or pipe, which is improperly driven or broken or shows partial collapse to such an extent as to materially decrease its bearing value, will be rejected. Rejected shells or pipes shall be removed and replaced, or a new shell or pipe shall be driven adjacent to the rejected one. Rejected shells or pipes, which can not be removed, shall be filled with lean concrete by the Contractor at his expense.

c. Piles Cast in Drill-Borehole

i) Boring Procedure

The method and equipment of boring generally either the dry method, wet method, temporary casing method or permanent casing method shall be one which maintains stability, verticality or batter (as shown on the Drawing) of the wall and base of borehole by the use of temporary casing and/or bentonite slurry.

All holes shall be drilled to the tip elevation shown on the Drawings, unless otherwise specified or approved by the Engineer. Rejected boreholes shall be filled with lean concrete by contractor at his expense.

The method shall be such that allows soil samples to be taken and in site soil test, (if required) to be carried out during or ahead of boring operations. The method/procedure used in execution of borehole and other operations shall not be such as to cause vibrations resulting in damage to completed or partially completed piles or to adjacent structures, services or other property. The procedure shall not be such as to cause harmful loosening or softening of soil outside the pile that has to be filled with concrete. The equipment used for execution of borehole shall be adequate to ensure that each pile penetrates to the required founding level.

• Use of Casing

Suitable casings shall be furnished and placed when required to prevent caving of the hole before concrete is poured. Casing, if used in drilling operations shall be removed from the hole as concrete is poured unless otherwise specified. The bottom of the casing shall be maintained not less than fifty (50) cm below the top of the concrete during withdrawal and pouring operations unless otherwise permitted by the Engineer.

Separation of the concrete during withdrawal operations shall be avoided.

- **Reinforcement**

Reinforcement if called for shall conform to the requirements under item-Reinforcement. The steel shells/pipes shall be of sufficient strength and rigidity to permit driving to the required bearing value or depth without injury. The steel may be either cylindrical or tapered, step tapered or a combination, plain, circular or fluted. All types shall conform to the corresponding ASTM standards. The minimum average tensile strength of steel shall be 3500 Kg/sq.cm (50,000 psi).

When called for on the Drawings or by the Engineer, the steel shells/pipes shall be factory coated on both interior or exterior surfaces by red lead paint conforming to AASHTO M-72 or as stated in the special specifications. The coating shall not cause any hindrance while assembling the pile section during welding operations.

- ii) **Temporary Casing Method**

The temporary casing of appropriate diameter for locating the pile and piloting the borehole shall be pitched at the exact locations as given on the drawings to ensure that the casing when sunk is within the specified tolerances. The casing shall be sunk to sufficient depth by approved methods. The depth shall be at least sufficient to prevent the ingress of alluvium or other loose materials into the bore when executed below the bottom level of the casing. In addition, the depth shall be such as the contractor considers necessary for the stability of the casing and/or temporary works system during construction in general and for the following conditions and operations in particular during all conditions of river current which may occur during the period of works:

- a. Open temporary casing to ensure against blow-in of soil.
- b. Concreting of the pile, until temporary casing is extracted.

- **Safety of Casing**

The contractor shall take all such measures and provide such strengthening and bracing as is necessary and to the approval of the engineer to ensure that the temporary, casing is not disturbed, overturned, overstressed or under-eroded in any condition of temporary casing shall be such that it will not disturb the freshly cast concrete and/or permanent lining and/or reinforcement.

Where the use of temporary casing is approved for the purpose of maintaining the stability and over-rapid withdrawal of the boring tools which could lead to excessive removal of soil and water and disturbance of the surrounding ground and when boring through any permeable stratum (including silt), the water level in the

boring shall be maintained between one (1) meter and two (2) meters above the external water level, unless the engineer directs otherwise.

The temporary casings shall be free from significant distortion and of uniform cross sections throughout each continuous length. During concreting they shall be free from encrusted concrete or any internal projections which might prevent the proper formation of the piles.

- **Permanent Casing Method**

The permanent casing construction method shall be used when required by the plans. This method consists of driving or drilling a casing to a prescribed depth before excavation begins. If full penetration cannot be attained, the Engineer may require either excavation of material within the embedded portion of the casing or excavation of a pilot hole ahead of the casing until the casing reaches the desired penetration. In some cases, over-reaming to the outside diameter of the casing may be required in order to advance the casing.

The casing shall be continuous between the elevations shown on the plans. Unless shown on the plans, the use of temporary casing in lieu of or in addition to the permanent casing shall not be used except when authorized by the Engineer in writing.

After the installation of the casing and the excavation of the shaft is complete, the casing shall be cut off at the prescribed elevation and the reinforcing steel and shaft concrete placed within the portion of the casing left in place.

iii) **Bentonite Slurry**

Where the use of bentonite slurry is approved for the purpose of maintaining the stability of the walls and base of bore, the contractor's proposals in accordance with (sub clause vi) hereof shall include details of the slurry. These shall include inter-alia:

- a. The source of the bentonite.
- b. The constitution of the slurry.
- c. Specific gravity, viscosity, sheer strength and PH value of slurry.
- d. The methods of mixing, storing, placing, removal and re circulating the slurry, and
- e. The provision of stand-by equipment.

Tests shall be carried out to ensure that the proposed constitution of the slurry is compatible with the ground water. Proposals for the constitution and physical properties of the slurry shall include average, minimum and maximum values. The specific gravity of the slurry shall not be less than one and three hundredth (1.03) in any case at any time. The contractor

shall use additives where necessary to ensure the satisfactory functioning of the slurry.

Manufacturers Certificate

A manufacturer's certificate showing the properties of the **bentonite** powder shall be delivered to the Engineer for each consignment delivered to site. Independent tests shall be carried out at laboratory approved by the Engineer on samples of **bentonite** frequently.

Tests on Bentonite Slurry

The Contractor shall carry out tests during the course of the piling to check the physical properties of the **bentonite** slurry in the works. These tests shall include, inter-alia, density, viscosity, shear strength and PH tests. The test apparatus and test methods shall be those given in "Recommended Practice" Standard by American Petroleum Institute, New York City, 1957, ref. API RP29, Section-1, II and VI.

The frequency of tests shall be that which the Contractor considers necessary to ensure that the **bentonite** slurry is in accordance with his proposals and as such other times as the Engineer may direct.

Should the physical properties of any **bentonite** slurry deviate outside the agreed limits, such slurry shall be replaced, irrespective of the number of time it has been used by new **bentonite** slurry of correct physical properties.

Adequate time shall be allowed for proper hydration to take place, consistent with the method of mixing, before using slurry in the works.

Precautions

The Contractor shall control the **bentonite** slurry so that it does not cause a nuisance either on the site or adjacent waterways or other areas. After use it shall be disposed in a manner to the approval of the Engineer.

The level of the slurry in the **bentonite** shall be maintained so that the internal fluid pressure always exceeds the external water pressure.

If chiselling is used when boring through hard strata or to overcome obstructions, the stability of the excavation shall be maintained by methods acceptable to the Engineer.

iv) Excavation From Boreholes

The soil and debris from inside the pile boreholes shall be removed by bucket, augur or circulating **bentonite** slurry provided that no jetting at the foot of the borehole shall be permitted. Methods of excavation, which in the opinion of the Engineer may damage the permanent lining of the pile, shall not be employed.

Should the excavation reveal any soil stratum below the bottom

of a pile which is, in the opinion of the Engineer, unsuitable for supporting the loads that will be imposed on it, the Contractor shall remove all such sub soil stratum to the satisfaction of the Engineer and shall lengthen the pile if necessary and cost of any such lengthening shall be paid as per this contract.

Excavation shall be carried out as rapidly as possible in order to reduce to a minimum the time in which any strata are exposed to the atmosphere, bentonite slurry or water. In any case, a pile shall not remain unfilled with concrete for period exceeding eighteen (18) hours after completion of borehole.

The materials from pile excavation shall be disposed so that the same does not interfere with any part of the permanent works of this project, in neat and workmanlike manner.

v) Samples and Tests

The Contractor shall take soil samples as given below or as directed by the Engineer to the designed tip elevation of the pile and shall carry out in situ Standard Penetration tests within, and ahead of borehole on the line of vertical axis of the pile at these locations after one and half (1.5) " meter interval. The costs of tests and collection of samples shall be deemed to be included in the unit rates quoted by the Contractor. Each disturbed sample shall, as far as possible, be truly representative of the grading of in situ soil at the point from which it is taken, without contamination by other material. It shall be approximately five (5) Kg in weight and shall be placed in a strong air tight container immediately after its removal from the sampler. The container shall be sealed as soon as the sample has been placed in and shall be taken to the site laboratory for grading, moisture content and Atterberg Limits tests.

The apparatus and procedure for the Standard Penetration Test shall be in accordance with the provisions of ASTM D 1586 Penetration Test and split-barrel sampling of soils and/or ASTM D 1587 thin-walled sampling of soils, (except insofar as any such provisions may conflict with other requirements of the contract).

vi) Limitations of Boring Sequence

Piles shall be constructed in such a manner and sequence as to ensure that no damage is sustained by piles already constructed in adjacent positions. The Contractor shall submit to the Engineer for his approval a programme showing sequence of construction of various piles.

vii) Tolerances

Following construction tolerances shall be maintained:

- a. The drilled shaft shall be within 3 inches of the plan position in the horizontal plane at the plan elevation for the top of the shaft.
- b. The vertical alignment of the shaft excavation shall not

very from the plan alignment by more than 1/4 inch per foot of depth.

- c. After all the shaft concrete is placed; the top of the reinforcing steel cage shall be no more than 6 inches above and no more than 3 inches below plan position.
- d. When casing is used, its outside diameter shall not be less than the shaft diameter shown on the plans. When casing is not used, the minimum diameter of the drilled shaft shall be the diameter shown on the plans for diameters 24 inches or less, and not more than 1 inch less than the diameter shown on the plans for diameters greater than 24 inches.
- e. The bearing area of bells shall be excavated to the plan bearing area as a minimum. All other plan dimensions shown for the bells may be varied, when approved, to accommodate the equipment used.
- f. The top elevation of the shaft shall be within 1 inch of the plan top of shaft elevation.
- g. The bottom of the shaft excavation shall be normal to the axis of the shaft within 3/4 inch per foot of shaft diameter.

viii) Inspection

After the borehole has reached its final stipulated positions, after the samples have been taken out, as required by the Engineer and the borehole has been completely cleaned of all loose matter and otherwise made ready to receive the reinforcement and thereafter the concrete, the contractor shall so inform the Engineer.

The Engineer shall inspect the soil samples and test results thereon, check the elevation of the bottom of the borehole and the amount and direction, if any, by which the top of the casing is out of position, or out-of-plumb having satisfied himself on these and on any other points which he may consider relevant shall sign permission authorizing the Contractor to proceed with the placing of the reinforcement. The Contractor shall under no circumstances proceed with the placing of reinforcement or with the subsequent concreting without having first obtained the authority signed separately for each and every borehole by the Engineer.

ix) Pile Reinforcement

The reinforcement for each pile shall be assembled and securely tied by means of binding wire and by welded reinforcement rings of twenty five (25) mm diameter bar as shown on the drawings, in such a manner as to form a rigid cage.

The required concrete cover to the reinforcement shall be maintained by suitable spacers securely attached to the

reinforcement and of sufficient strength to resist damage during handling of the reinforcement cage into the pile. The distance between the spacers shall be such that the required cover is maintained throughout and that there is no displacement of the reinforcement cage in the course of the concreting operation.

Should the Contractor prefer to lower the reinforcement cage assembly into the borehole in sections, he may do so provided the same lapping requirements as for assembly on the ground are followed, namely, the longitudinal reinforcement shall be lapped as shown on the drawings and the spiral reinforcement shall be doubled over the lap zones. Spacers maintaining concrete cover shall be located immediately below and above the laps at 4 points spaced around the cage.

2.2 Concreting of Piles

In general, item Concrete of the General Specifications shall be followed, however, the following particular requirements shall be observed.

i) Materials

Compressive strength of concrete in piles shall be of class A3 as prescribed in Item Concrete, except if otherwise indicated.

Suitable retarder, plasticizer may be added as approved by the Engineer.

The Contractor shall submit the detailed proposed additive for approval, which shall be approved after laboratory trial mix results. The dosing of retarders shall ensure initial setting time of not less than five (5) hours corresponding to the ambient temperature at which the concreting is proposed to be carried out.

ii) Commencement of Concreting

Prior to placing any concrete

- a. Any heavy contaminated bentonite slurry, which could impair the free flow of concrete from the tremie pipe, shall be removed.
- b. Any loose or soft material/water soil shall be removed from the bottom of the bore by methods acceptable to the Engineer.

The Contractor shall not proceed with the concreting of the pile until the Engineer gives specific permit to do so after satisfying himself of the:

- ✓ Adequacy of the Contractors equipment and arrangement.
- ✓ Proficiency of his personnel.
- ✓ Cleanliness of the borehole.

Contractor shall have a suitable lighting arrangements at all times for inspecting the entire length of the shells, pipe or hole before placing the reinforcing steel or concrete.

Prior to the concreting a pile, sample of slurry shall be taken from the base of the borehole using an approved sampling device and its specific gravity shall be determined.

iii) **Placing of Concrete**

The **tremie** shall be of not less than two hundred and fifty (250) mm diameter made of water-tight construction. The means of supporting the **tremie** shall be such as to permit the free movement of the discharge end in the concrete in the pile. The **tremie** pipe shall be fitted with **traveling** plug, which shall be placed at the top of the pipe before charging the **tremie** pipe with concrete as barrier between the concrete and water or **bentonite** slurry, so as to prevent water or **bentonite** slurry entering the tube and mixing with the concrete. **The tremie** shall be carefully lowered into the borehole so that the end of the tube shall rest at about one hundred and fifty (150) mm above the bottom of the borehole, with reinforcement in the borehole, and the hopper end of the **tremie** tube shall be filled with concrete as aforesaid. It shall be slightly raised so that when the concrete reaches the bottom it flows out of the lower end of the tube, and fills the bottom of the borehole. Thereafter, the rate of withdrawal of the **tremie** shall be gradual so as to ensure the end of the **tremie** pipe is always one and half (1.5) meters below the top of the concrete in the borehole. An allowance shall be made for the top five hundred (500) mm of concrete in borehole during concreting being unsatisfactory. When the next batch is placed in the hopper the **tremie** shall be slightly raised but not out of the concrete at the bottom, until the batch discharges to the bottom of the upper. This operation shall be controlled by calculating the volume of concrete required to fill one linear meter of pile and then by measuring the rate of withdrawal of the tube corresponding to the volume of the batch in the hopper. The flow shall then be retarded by lowering the tube. The depth of the concrete in borehole shall be measured at intervals to keep a constant check that the **tremie** pipe bottom is immersed in concrete.

Concreting in each pile shall be carried out in a continuous operation without stoppages until the pile has been completed.

If the bottom of the **tremie** pipe ceases to be immersed in the body of the concrete in the pile and the seal is broken, concreting shall cease immediately and such remedial measures as the Engineer may accept or direct shall be carried out. The Contractor shall take precautions to ensure that the concrete is free of voids and shall prevent the entry of water and/or collapse of soil into concrete. If any soil or other deleterious or extraneous materials fall into any pile excavation prior to or during concreting, it shall be removed immediately.

Concreting shall continue until the concrete has reached an elevation five hundred (500) mm higher than the designated pile cut off level shown on the drawings, or as otherwise directed by the Engineer.

The concrete shall be placed in one continuous operation from tip of cut-off elevation and shall be carried out in such a manner as to avoid segregation. The method of placing the concrete and the consistency (slump) shall conform to the requirements or to the satisfaction of the Engineer.

No shell or pipe shall be filled with concrete until all adjacent shells, pipes or piles within a radius of three (3) M or five (5) times the pile diameter, whichever is greater, have been driven to the required resistance.

After a shell or pipe has been filled with concrete, no pile shall be driven within seven (7) meters thereof until at least seven (7) days have elapsed,

2.3 Withdrawal of Temporary Casing

If the method of construction involves partial withdrawal of temporary casing as concreting proceeds, a sufficient head of concrete shall be maintained above the bottom of the -temporary casing to ensure that no voids are formed within the pile and to prevent the entry of ground water and to prevent the collapse of soil into the concrete.

If such entry or collapse should occur, the temporary casing shall be re-driven before the concrete has set and all defective concrete shall be removed or the construction of the pile shall be abandoned, in which case the provision of the clause herein which refers to "Defective Piles" shall apply.

The withdrawal of the temporary casing shall be carried out before the adjacent concrete has taken its initial set.

The method and timing of withdrawal must be such as to ensure that the space between the pile and the surrounding ground shall be filled with concrete.

2.4 Cutting of Piles

Tops of piles shall be embedded in the concrete footing as shown on the drawings.

Concrete piles shall, when approved by the Engineer, be cut off at such a level that at least five (5) cm of undamaged pile can be embedded in the structure above. If a pile is damaged below this level, the Contractor shall repair the pile to the satisfaction of the Engineer. The longitudinal reinforcement of the piles shall be embedded in the structure above to a length equal to at least (40) times the diameter of the main reinforcing bars. The distance from the side of any pile to the nearest edge of the footing shall not be less than twenty (20) cm.

When the cut-off elevation for a precast concrete pile, steel shell, pipe or for a cast-in-place concrete pile is below the elevation of the bottom of the pile cap, the pile may be built up from the butt of the pile to the elevation of the bottom of the cap by means of a reinforced concrete construction, if approved by the Engineer.

2.5 Defective Piles

Any pile delivered with defects such as damaged during driving or cast in situ, placed out of its proper location, incapable or partially capable of permanently carrying the load which it is intended to carry, driven below the elevation fixed by the Drawing or by the Engineer, due to the immature setting of the concrete in the pile or due to caving/collapse of the borehole fully or partially, or due to any cause of which Engineer shall be sole judge to determine shall be corrected at the contractor's expense by one of the following methods approved by the Engineer:-

- a) The pile shall be withdrawn and replaced by a new and when necessary, by longer pile.
- b) A second pile shall be driven or cast adjacent to the defective pile.
- c) The pile shall be spliced or built up as otherwise provided herein or the underside of the footing lowered to properly imbed the pile.

The contractor shall undertake such additional tests/works as the Engineer may specify to provide additional foundations to supplement the defective piles and so modify the structure to be supported as to ensure that load will be transferred safely to the additional foundations of existing pile. The contractor shall be responsible for the cost of such additional functions and tests and/or of the extra work carried out in such modification to the structure.

A concrete pile shall be considered defective if it has a visible crack or cracks, extending around the four sides of the pile, or any defect, which, in the opinion of the Engineer affects the strength, or life of the pile.

When a new pile is driven or cast to replace a rejected one, the Contractor, at his expense, shall enlarge the footing as deemed necessary by the Engineer.

2.6 Test Piles

Test piles which are shown on the Drawings or ordered by the Engineer shall conform to the requirements for piling as specified and shall be so located that they may be cut-off and become a part of the completed structure.

Test piles to be load tested in accordance with Item 2.7 shall be driven in locations determined by the Engineer. These piles shall not be utilized in the structure unless otherwise directed.

Test piles driven by the Contractor for his own use in determining the lengths of piles to be furnished may be so located and they may be cut-off and become a part of the completed structure provided that such test piles conform to the requirement for piling in these specifications.

Any pile, which after serving its purpose as a test pile is found unsatisfactory for utilization in the structure, shall be removed if so ordered by the Engineer, or if approved by the Engineer it shall be cut-off below the ground line and footings, but such approval does not in any way relieve the Contractor of his responsibilities.

Test piles shall generally be driven with the same equipment that is to be used for driving foundation piles. When required, the ground shall be excavated to the elevation of the bottom of the footing before the test pile is driven.

When diesel hammers are to be used for driving end bearing piles, or friction piles where the bearing capacity shall be checked by pile driving formulas, the Contractor shall in advance carry out test piling or load tests to determine the energy developed by the hammer. The Contractor may elect one of the following methods for the calibration:

- a) By test driving the same type of piles successively with diesel hammer and gravity or single acting hammer, or by driving two different piles with diesel hammer and gravity or single acting hammer respectively.

- b) By driving test piles to a depth determined by the Engineer and load testing the same piles in accordance with Item.2.7.
- c) Calibration tests shall be made at least at two different sites until the results are satisfactory to the Engineer.

Calibration of diesel hammers may not be required if the hammer has been previously calibrated under soil conditions and for the same size and type of pile, provided that the calibration data is accepted by the Engineer.

2.7 Load Tests

A load test shall consist of the application of a load equal to a minimum of 2 times the specified bearing capacity or as otherwise provided for herein or as directed by the Engineer. Load tests shall be made where specified and/or where called for by the Engineer. Unless otherwise permitted by the Engineer, the load tests shall be completed before the remaining piles in the same structure are driven or cast.

Load tests shall be made by methods approved by the Engineer. The Contractor shall submit to the Engineer detailed plans of the loading system and apparatus he intends to use at least three (3) weeks in advance. The apparatus shall be so constructed as to allow the various increments of the load to be placed gradually without causing vibration to the test piles. Tension anchor piles if used, shall be of a design and driven to a depth satisfactory to the Engineer. Steel shells or piles whose walls are not of adequate strength to withstand the test loading when empty, shall have the required reinforcement and concrete placed before loading. The load test shall not be started until the concrete has attained a minimum compressive strength of ninety five (95) percent of the design twenty eight (28) days compressive strength. If he so elects, the Contractor may use high early strength cement in the concrete of the load test pile and the tension piles.

Suitable approved apparatus for determining accurately the load on the pile and the settlement of the pile under each increment of load shall be supplied by the Contractor. The apparatus shall have a working capacity of three times the design load for the pile being tested. Reference points for measurement of pile settlement shall be sufficiently away from the test pile to preclude all possibility of disturbance.

All pile load settlements shall be measured by adequate devices, such as gauges, and shall be checked by means of an Engineer's level. Increment of deflection shall be read just after each load increment is applied and at 15-minute intervals thereafter. The safe allowable load shall be considered as 50 percent of the load which, after 48 hours of continuous application, has caused not more than 6 mm of permanent settlement, measured at the top of the pile.

The first load to be applied to the test pile shall be 50%, of the pile design load and the first increment shall be up to the pile design load by applying additional loads in three equal increments. A minimum period of 2 hours shall intervene between the applications of each increment; except that no increment shall be added until a settlement of less than one tenth (0.1) mm is observed for a 15-minute interval under the previously applied increment. If there is a question as to whether the test pile will support the test load, the

load increments shall be reduced by fifty (50) percent, at the direction of the Engineer, in order that a more closely controlled failure curve may be plotted. The full test load shall remain on the test pile not less than forty eight (48) hours. The full test load shall then be removed and the permanent settlement read.

When directed by the Engineer load tests shall then be continued beyond the double design load in 10-ton increments to failure or a maximum of three (3) times the design load.

The pile may be considered to have failed when the total permanent settlement exceeds (6) mm.

2.8 Backfilling Empty Boring

When each pile has been cast, the empty bores remaining shall not be back-filled unless required by the construction procedures and activities following the completion of piling work.

2.9 Pile Records

The Contractor shall keep records of the piles driven or installed. A copy of the record shall be given to the Engineer within two (2) days after each pile is driven. The record form to be used shall be approved by the Engineer. The pile records shall give full information on the following:

Cast-in-Place Piles

- Pile type and nominal dimensions.
- Date of boring commenced, level reached each day and date of casting.
- Soil samples taken from pile boring operation and soil test results.
- Strata and ground water encountered with levels, description shall be in accordance with B.S.C.P. 2001.
- Length of finished pile and tip elevation.
- Dia of borehole.
- Date of placing concrete; theoretical and actual quantities of concrete used in pile.
- Lengths and diameter of temporary casing and permanent lining and the elevation of the tip of temporary casing and of permanent lining.
- Details of Reinforcement.
- Details of penetration during boring operation or driving of steel shell (driving records as for driven piles).
- Quality, consistency and other test results on concrete.
- Time interval between boring or driving and concreting.

On completion of the piling for each structure, the Contractor shall deliver to the Engineer a drawing recording the exact location and the final depth (tip elevation) of all piles.

2.10 Confirmatory Boring

The contractor shall carry out confirmatory boring at bridge site at locations indicated by the Engineer.

Boring shall be carried out with ASTM D-1586 Penetration Test and Split barrel sampling of soil. Additionally, when undisturbed sampling is required, the procedure shall conform to ASTM D-1587, Thin Walled sampling of soil.

Diameter of boreholes shall be twenty (20) centimetres cased through out its

length and shall be down to the designated elevation. In-situ standard penetration test shall be carried out at one and half (1.5) meters interval from designated top elevation to the bottom of the hole. Undisturbed samples shall be taken from substratum. If clay is encountered, undisturbed samples will be taken at interval of three (3) meters.

At least two borings are required at each bridge site. The boring shall extend to a depth of at least three (3) meters below the pile tip elevation as indicated in the drawings.

3. MEASUREMENT AND PAYMENT

3.1 Measurement

The quantities to be paid for shall be the number of linear meters of piles, completed and accepted, measured from the pile tip elevation to the bottom of pile caps, footings or bottom of concrete superstructure in the case of pile bents. In case the bottom of pile caps or footing or bottom of pile bent is above N.S.L and method of fabrication is such that the work above N.S.L is done as that of column, the same shall be measured as concrete and steel for column. No allowance shall be made for cut-offs or the required length of concrete or reinforcement steel placed into the concrete structure as called for on the drawings. Any additional pile lengths that may be necessary to suit the Contractor's method of operation or for any other reason shall not be included in the measurements.

For cast-in-situ piles, helical and vertical steel will be measured in Tons. Pile casing where ever provided will be measured in linear meters. Measurement shall be made for permanently placed pile casing s shown on drawings. If the Contractor likes to use temporary casing for the convenience of preparing of boreholes, the same shall not be measured whether left at site or withdrawn after completing the boreholes.

Test piles when ordered by the Engineer, whether or not utilized as service piles in the structure shall not be included in the above measurements. Accepted test piles will be measured separately as the number of linear meters.

- Pile shoes when called for on the Drawings or by the Engineer shall be measured by the number accepted in place.
- Splicing of piles if not shown on the drawings will not be allowed except that the length of reinforcement is to exceed 12 meter in which case the splicing will not be measured or paid directly but the cost thereof shall be considered as included in the unit price for piling.
- Load tests shall be counted as the number of complete and accepted load tests as described in Item 2.7.

3.2 Payment

- The quantities of piling left in place in the accepted structure measured as provided above shall be paid for at the contract unit price per linear meter of piles of the different types listed below and shown in the Bill of Quantities.
- For cost-in-situ piles, rate per linear meter will include all items except for helical and vertical reinforcement, which will be paid as per steel

reinforcement item.

- For pre cast piles, the cast of steel shall be included in the rate per linear meter.

Pile casing will be paid at the contract unit price per linear meter for pile casing.

Test piles whether or not used in the completed structure or constructed adjacent to structure as per requirements of the contract document shall be paid for at the contract unit price for pile installation.

Load tests shall be paid for at the contract unit price for pile load Tests, either one and half (1.5) times or two (2) times the design load. The unit price for test loading to three (3) times the design load shall include the total load test with all load increments as described in Item.2.7.

Payment for tubular steel piles left in place shall include the cost of the concrete core of the specified class of concrete and the steel reinforcement of the said concrete core.

The quantity to be paid for confirmatory boring shall be the number of linear meters of the boring completed and accepted.

Such prices and payment shall be considered full compensation for furnishing all materials, performing standard penetration and all other relevant laboratory tests, labour, equipment, tools, fuel, welding, if needed and other incidental expenses including splicing, caging providing covers etc. necessary to complete the item as directed by the Engineer.

Pay Item No.	Description	Unit of Measurement
1.	Boring in any kind of soil	Rft
2.	Boring in hard rock	Rft
3.	Load Test Index Pile	No.
4.	Load Test Work Pile	No.
5.	Steel Lining	MT

QUALITY CONTROL AND SITE FACILITIES

This Section of Specifications prepared for the quick reference of the Contractor/ Supervisory Staff at site for Standard Specification of Material and Testing. However, Engineer-In-Charge at his discretion may require additional numbers of tests in respect of time to time supply of material at site.

All the preparation of Testing Samples, Transportation and Carry out of the tests in approved Laboratory in the presence of Engineer's representative will be born by the

Contractor. Engineer may instruct further tests at his discretion at Contractor's cost.

1. LABORATORY FACILITIES AT SITE

Contractor shall build and equip and maintain at his own cost a Laboratory at site for testing of Material and samples.

The following testing equipment will be kept in the laboratory. The laboratory will be under an experienced Quality Control Engineer and Material Technicians and cost tests will be borne by the Contractor.

- Concrete Cube/cylinder testing Machine with recent calibration Certificate.
- British Standard/ASTM Sieve Set.
- Field Density Testing Equipment
- Cube Moulds (18 Nos.)
- Slump Test Apparatus 2 Nos.
- Triple Beam Balance with calibrated with accuracy
- 0.5 gram Electronic Oven
- Speedy Moisture Tester
- Curing Tanks
- Linear Measuring Devices, scales and Vernier Calliper
- Weighing Scale of 100 kg capacity.
- 25mm, 18mm, 12mm, 9mm, 6mm framed Screens (1.00mx1.25mm size) for quick checking of coarse aggregates gradation at storage bins.
 - The Frequency of Testing will be instructed
 - Testing of Reinforcing Steel Bars and Structural Steel samples will be tested from an outside laboratory approved by the Engineer
 - The cost of testing of Reinforcing bars will be borne by the Employer.

2. SURVEY INSTRUMENTS

Following Survey Instruments to be made available by Contractor for Checking by Engineer's Surveyor:

- Total Station with Electronic Data Reading and Recording
- Distomat with Prisms
- Quick Setting Levelling Instruments with Surveyor Rods (Meters).
- Steel Measuring Tape (50m)

3. SITE FACILITIES

Contractor will at his own cost provide site facilities with equipment and maintenance for his staff, labour and storage. Contractor will also provide the Site Office consisting of four (4) rooms and a conference room for 15 persons for the Consultants Supervision Engineer and Staff.

4. LIST OF CODES AND STANDARDS

The list of Civil Engineering Code and Standards referred to or permitted for reference for the Contract Specifications for Material, Workmanship, Testing and Quality Assurance. A copy of these Codes should be kept available at site by the Contractor.

a. British Standards (BS)

➤ BS – 12	Portland Cement Ordinary and Rapid Hardening (In lieu of C-150)
➤ BS – 410	Test Sieves
➤ BS – 693	General Requirements for Oxyacetylene Welding of Mild Steel
➤ BS – 882-1201	Concrete aggregates from Natural Sources.
➤ BS – 1881	Methods of Testing Concrete.
➤ BS – 3148	Tests for Water for Waking Concrete
➤ BS – 4027	Sulphate Resisting Portland Cement
➤ BS – 4449:1988	Carbon Steel Bars for the Reinforcement of Concrete

b. Latest ASTM Standards

➤ A 615-94	Deformed Billet Steel Bars for Concrete Reinforcement
➤ C 33-93	Standard Specification for Concrete Aggregates
➤ C 39-93a	Compressive Strength of Cylindrical concrete Specimens
➤ C 42-90	Standard Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
➤ C 94-94	Standard Specification for Ready Mixed Concrete
➤ C 138-92	Standard test method for unit weight, Yield, and Air Content (Gravimetric) of Concrete
➤ C 143-90a	Standard Method of Test for Stump of Hydraulic Cement
➤ C 150-94	Standard Specification for Portland Cement
➤ C 171-92	Standard Specification for Sheet Materials for Curing Concrete
➤ C 172-90	Standard Method of Sampling fresh Concrete.
➤ C 173-94	Standard Method of Test for Air Content of freshly Mixed Concrete by the Volumetric Method.
➤ C 208	Standard Specification for Insulating Board (Cellulosic fibers) Structural and Decorative.
➤ C 231-91b	Standard Method Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
➤ C 260-94	Standard Specifications for Air Entraining Admixtures for Concrete
➤ C309-93	Standard Specification for Liquid Membrane-Forming Compounds for curing Concrete.
➤ C 494-92	Standard Specification for Chemical Admixtures for Concrete.
➤ E 329-90	Specification for minimum requirements for agencies engaged in the testing and or inspection of materials used in construction

c. ACI Standards

➤ ACI – 318	Building Code Requirements for Reinforced Concrete
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- d.** In addition, the latest editions of American Concrete Institute Standards, American Society for Testing and Materials Standards, AWS and AISC should be referred and other Standards as may be specified by the Engineer for special Materials and Construction are also relevant.

4.3 DAMPPROOFING, WATERPROOFING & CAULKING

pages 4.3-1 to 4.3-3

4.3.1 SCOPE OF WORK

Consists of furnishing all plant, equipment, appliances, labor and materials and performing all operations in connection with supply, application, fabrication and installation in positions and locations all damp proofing, waterproofing and caulking of all surfaces enumerated hereinafter in accordance with requirements of Drawings, as specified herein and specifications of the manufacturers, and subject to the Terms and Conditions of the CONTRACT Documents.

Without limiting or restricting the volume or generality of the foregoing, the work consists of the following:

.1 Damp proofing

All exterior surfaces of foundation walls slabs and foundations below grade. As well as Slab on Grade and bracing beams in contact with earth.

.2 Waterproofing

The installation of all waterproofing approved by the ARCHITECT over concrete slabs and walls where indicated on Drawings.

.3 Caulking

Perimeter of all exterior doors and windows where frames abut masonry walls, concrete or steel lintels and wherever else caulking is indicated.

4.3.2 WORK NOT INCLUDED

Waterproofing of all exterior roof, deck or terrace surfaces is not included in the work of this Section. (See Section 4.5 ROOFING). Waterproofing of exterior walls above grade. (See Section 4.11 PAINTING).

4.3.3 MATERIALS

.1 General

All materials to be new, of best grade and quality to that specified and guaranteed to perform the function required for stated use by vendors.

.2 Membranous Waterproofing

All materials delivered to job in sealed manufacturer's containers bearing original labels and conforming to the best local standard specifications available for the intended use and purposes.

.1 Coal-Tar Pitch

Coal Tar Saturated Roofers Felt; Fibrous Asphalt; Creosote Oil; shall conform to the foregoing requirements.

.2 Coal-Tar Saturated Fabric

At the option of the CONTRACTOR, thermoplastic bitumen treated fibrous glass membrane, average strength and pliability, may be used in lieu of coal-tar saturated roofers felt.

.3 Dampproofing

.1 Exterior surfaces of all foundation walls below grade, including tops of foundations where they exist, to be cleaned and dampproofed by the application of Proprietary Material as specified in the BOQ, complete as per manufacturer's instructions.

.2 **Horizontal Dampproofing over fill** - One layer of pure 4 mm (0.004 inch) polyethylene film, lapped 6" on sides to be provided over 6" of compacted gravel or stone fill. Care shall be taken to insure that no sharp edges of stone protrude and rupture this film. Any damage shall be repaired to the satisfaction of the ARCHITECT to ensure an impermeable vapour seal.

4.3.4 WORKMANSHIP

.1 Dampproofing

All workmanship of best quality, complete as per manufacturers instructions, to ensure realization of all guarantees and warranties.

.2 Waterproofing

All workmanship of best quality, complete as per manufacturers

instructions, to ensure realization of all guarantees and warranties.

.3 Caulking

All workmanship of best quality, complete as per manufacturers instructions, to ensure realization of all guarantees and warranties.

4.3.5 PROTECTION

After waterproofing has been applied, it shall be protected from damage or wear. If waterproofing becomes damaged or in any way pervious, and, in the judgement of the ARCHITECT, it cannot be effectively patched or otherwise repaired, it shall be removed and replaced to the extent necessary to waterproof the surface satisfactorily.

4.3.6 GUARANTEE

The applicable requirements set forth in the General Conditions of the CONTRACT Documents are hereby modified in connection with the work under this Section, to the extent that the duration of the Guarantee period for all work performed under this Section shall be not less than 10 years, from the expiry of the Period of Maintenance.

4.3.7 MEASUREMENT & PAYMENT

Works shall be measured net acceptably completed and as applied in position as the net actual visible area of the treated surface in square feet describing the kind and quality as conforming to the Drawings and the instructions of the ARCHITECT. Each measurement shall be taken to the nearest inch. However, this rule shall not apply to any dimensions stated in descriptions.

4.4 MASONRY

pages 4.4-1 to 4.4-11

4.4.1 SCOPE OF WORK

Consists of furnishing all labor, tools, scaffolding, hoisting equipment and mason materials of every kind and charter; and in performing all operations in connection with procurement, transportation and delivery, erection and building-in of all work classified as mason work and/or included as such herein, i.e., concrete masonry units; masonry mortars; and all related items and appurtenances, including all items supplied by other trades and customarily built-in and/or installed under mason work or required to complete mason work, in strict accordance with the requirements of the Drawings and Schedules, as specified herein, and subject to the Terms and Conditions of the CONTRACT Documents.

4.4.2 GENERAL

Materials specified hereinafter and required to complete work shall be subject to ARCHITECT's approval at all times as to kind, quality, finish, color, function and strength, and be new materials.

In addition to materials specified herein, all applicable masonry materials required and not specifically referenced or specified herein shall comply with the requirements set forth in Section 4.2 herein before. Masonry block units of thickness indicated to Drawings and type block units shall conform to fire resistive ratings required by applicable Building Codes and/or Local Building Construction Standard Practices for the various purposes for which they are used, and/or as approved otherwise by the ARCHITECT.

Without limiting or restricting the volume or generality and/or specified locations thereof, materials shall consist of the following items:

.1 Anchors and Ties

Of heavy galvanized metal of following types, and furnished as specified hereinafter. Design, size and weight of anchors and ties to be approved by ARCHITECT. All metal gauges are U.S.A. Standards, unless specified otherwise.

.1 Wire Mesh Ties - Not less than #16 ga.. (Steel Wire Gauge) 12mm mesh, 75mm wide.

- .2 Wire Ties - Min #10 ga. (Steel Wire Gauge), looped at both ends.
- .3 Corrugated or crimped Metal Ties - Not less than 22mm wide and #22 ga. (Manufacturer's Standard Gauge).
- .4 Dovetail Type Anchors and Wire Ties for use in embedded Slots or Inserts - Not less than #16 ga. (Manufacturer's Standard Gauge) for anchors and not less than #9 ga. (Birmingham Wire Gauge) for wire ties.
- .5 Rigid Steel Straps - Strap anchors 30mmx4.5mm" with ends turned up not less than 50mm
- .6 Bars and Rods - Reinforcing Steel bars and rods to conform to requirements of the Local Building Standards and best known building practices and/or as approved by ARCHITECT.
- .7 Special Anchors - As detailed or required to accommodate specific anchoring conditions, finish and install all special anchors for any masonry work required by Drawings.

.2 Masonry Block Units

Standard concrete masonry block units shall be provided by CONTRACTOR for use where required throughout building structures fabricated from approved types of local masonry materials and conforming in every respect to the requirements specified hereinafter.

Units shall be uniform dimensions with reasonably smooth and true surfaces suitable for painting where so required, and equal to sample approved by the ARCHITECT.

Note: Concrete masonry units (concrete facing units) for all exposed face work shall have uniformly fine smooth surface faces of uniform colour and aggregate mix, and be free of any honeycombing or other imperfections or deformations that will present as unsightly appearance, all edges true and straight and at right angles with each other and without any chipped or otherwise broken edges.

No unit containing any of the foregoing defects shall be laid up in any wall under any condition. Non-compliance will be a subject for rejection by ARCHITECT. Comply with following requirements:

- .1 Of standard sizes, thicknesses and shapes, including control joint

block, closers and shapes required and necessary for the construction, and free from any deleterious matter that will stain plaster or corrode metal.

.2 Manufacture of Hollow Load Bearing Concrete Masonry Units shall conform to the following requirements:

- .1 This specification applies to hollow load bearing concrete masonry units made from Portland Cement and suitable aggregate such as sand, gravel, crushed stone, bituminous or anthracite cinders, burned clay, air cooled or expanded blast furnace slag and other slag.
- .2 **Cinder Aggregate** - The combustible content present in cinder aggregate shall not exceed 35 percent of the weight of the aggregate.
- .3 **Physical Requirements** - At the time of delivery to the Site of WORK, or if made on or about job site, the units shall conform to the physical requirements as follows:

Minimum face shell thickness	18mm
Compressive strength, <u>minimum</u> (average Gross Area)	70kg/cm ²
Water absorption, maximum	700kg/m ³
Moisture content, maximum percentage of total absorption	40%.

Permissible Variations in Dimensions - No over-all dimension (width, height, and length) shall differ more than 1/8" from the specified standard dimensions.

4. **Visual Inspection** - All units shall be sound and free from cracks or other irregularities or defects that would interfere with the proper placing of the unit or impair the strength or performance.
5. **Sampling and Testing** - The OWNER and ARCHITECT shall be accorded proper facilities to inspect and sample the units at place of manufacture from lots properly cured & ready for incorporation in the Work. At least ten days shall be allowed for

completion of tests if deemed necessary by the ARCHITECT. The ARCHITECT or his representative reserves the right to make as many tests from a sampling of his own choice from the approved, manufactured and cured block units declared ready for use and testing. In case more than one sampling and testing of specimens fails to conform to the test requirements, the entire lot shall be a subject to rejection.

- 6. Curing** - Concrete masonry units after unmolding and proper "stacking" shall be stored under cover out of sun, in a well ventilated location where they can be mist sprayed and kept damp for a minimum of ten days, and then shall be allowed to completely dry out for an additional fourteen (14) days, and in no instance permitted to be again wetted by rain before testing and approved for use where required.

.3 Hollow Non-Load Bearing Concrete Masonry Units The applicable requirements specified hereinbefore for manufacture of hollow load bearing concrete masonry units

shall apply to "Non-Load Bearing" concrete masonry units except as follows:

Minimum face shell thickness	12mm
Compressive strength, <u>minimum</u> (average Gross Area)	22kg/cm ²
Water absorption, maximum	700kg/m ³
Moisture content, maximum	40% of total absorption

Permissible Variations in Dimensions - No over-all dimension (width, height, and length) shall differ more than 1/8" from the specified standard dimensions.

.4 Solid Load-Bearing Concrete Masonry Units

The applicable requirements specified hereinbefore for the manufacture of hollow load-bearing concrete masonry units shall apply to solid load-bearing concrete masonry units except as follows:-

Compressive strength, <u>minimum</u>	Grade A	Grade B
(average Gross Area) Average 5 units	126 kg/cm ²	140 kg/cm ²
Water absorption, maximum	700 kg/m ³	700 kg/m ³
Moisture content, maximum (% of total absorption)	40%	40%

Permissible Variations in Dimensions

The net cross-sectional area of the unit in every plan parallel to the bearing surface shall be greater than 75% of its gross cross-sectional area measured in the same plan.

.5 Surfaces of concrete blocks to be plastered shall have a rough or scoured surface suitable for providing a good bond for the plaster. All concrete blocks not plastered shall have neatly struck, clean, tight and flush joints, shall be of such consistency that they will firmly hold nails driven into them for the purpose of securing grounds.

.6 Set in Type A mortar.

4.4.3 MORTARS

.1 General

All cementitious and bonding material shall be delivered to the Site in manufacturer's unopened standard packages or containers. Mortars in which portland or other quick-setting cements are used shall be prepared in batches of the volume that will be used before initial set takes place, and in no case longer than 45 minutes before delivery for incorporation in work. Retempering of mortar is prohibited.

.2 Materials

.1 Portland Cement

As specified in Section 4.2 (Concrete Work).

.2 Lime

Shall be hydrated lime conforming to requirements of Irish Standard Specifications, with the further requirement that the total free (unhydrated) calcium oxide (CaO) and magnesium oxide (MgO) in the hydrated product shall not exceed 8 percent by weight, calculated on the "as-received" basis.

.3 Mortar Colour Pigments

Pigments for colouring of mortar shall be of high purity, chemically inert, unfading and alkali-fast mineral oxides, and shall be finely ground specially prepared for use in cement and lime mortars.

.4 Sand (Fine Aggregate)

Shall be of an acceptable colour and conform to the requirements of applicable local standard specifications. The ARCHITECT reserves the right to approve kind and quality of mortar in respect to gradation of sand used for size of joints.

.3 Classes and Proportioning of Mortars

The proportioning of various classes of mortars shall be as specified hereinafter. Proportions of cement specified are the minimum. Where sand which may be locally or readily obtainable, does not produce a mortar having the crushing strength herein specified for the particular class or classes of mortar required, but is in all other respects satisfactory, the sand content shall be decreased to the extent required to obtain that strength with relative density, bonding and value and properties

Quantities of Materials in Parts by Volume

Mortar Type A		Part
Grey Portland Cement		1
Hydrated Lime		
Natural Sand		6
Lime Putty		1
Use	Non-load-bearing Concrete Masonry Units	
Mortar Type B		
Grey Portland Cement		1
Hydrated Lime		
Natural Sand		4.5

Lime Putty Use	Load-bearing Concrete Masonry Units	0.5
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.4 Mixing of Mortars

1. Mortar shall be machine mixed in an approved type of mixer in which the quantity of water can accurately and uniformly be controlled; however, for work requiring only small batches of mortar grout, or when specifically approved by the ARCHITECT, mortar may be mixed by hand. Mixing time shall be not less than 5 minutes, approximately 2 minutes of which shall be for mixing the dry materials and not less than 3 minutes for continuing the mixing after the water has been added. Proportioning of materials for various classes of mortar shall be given in the table showing classification and proportions of mortars, in subparagraph 4.3.3 hereinbefore. Where hydrated lime is used for mortars requiring a lime content, CONTRACTOR shall have the option of using the dry-mix method of first covering the hydrated lime into putty. Hand-mixing shall be done in a tight mortar-mixing box. Where the dry-mix method is employed, materials for each batch shall be well raked and turned over together before the water is added, until the even colour of the mix materials indicates that the cementitious materials have been thoroughly distributed throughout the area and the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained.

.5 Setting-Bed Fills

Mortar for setting bed fills, for floor and other paving shall be of a consistency that will permit screening and tamping without drawing water to the surface.

4.4.4 HANDLING AND STORAGE

.1 General

Masonry units to be handled in careful manner to prevent undue chipping and breakage. Units with broken or chipped edges are subject to rejection and replacement. Storage piles, stacks, or bins to be located so as to avoid or be protected from heavy and unnecessary traffic.

4.4.5 ERECTION AND WORKMANSHIP:

.1 General

All masonry laid plumb, true to line, with level and accurately spaced courses and reveals, with corners plumb and true, and with each course breaking joints with the course below. Bond shall be kept plumb throughout. Units with greater than 12 percent absorption shall be wetted before laying.

Work required to be "built-in" in any masonry construction as work progresses, includes all anchors, expansion joint shields, barrier fins, loose lintels, bearing plates, structural steel bucks, door and window frames, access doors and frames, etc., wall plugs, flashing, etc. Masonry bases or concrete masonry units under equipment, except those built on rough slabs; and other accessories; unless specifically indicated otherwise on the Drawings, the spaces around all built-in equipment unless provided by others, i.e., mechanical trades, shall be filled in solid with appropriate masonry material and/or concrete if so indicated on Drawings, also all unit steel door bucks shall be filled in solidly with masonry and cement mortar. **Supply and install anchors for door bucks.**

.2 Concrete Masonry Units

Masonry units as specified hereinbefore erected where and as shown on Drawings. Each course solidly bedded in an approved mortar with vertical joints breaking halfway over course below. Vertical joints buttered their entire length. Each course bonded at corners and intersections, and either bonded into or anchored to the adjacent constructions with metal anchors spaced not over 1m on centres in both directions. No cells shall be left open in face surfaces. All units shall terminate against beam or slab soffits above and be wedged tight and joints flushed solidly with mortar. Jamb units of shapes and sizes required to bond with wall units and "built-in" where shown on Drawings. Sections of masonry units shall be incorporated in the masonry work where required to support plumbing or other fixtures, or to fill out at corners if approved by the ARCHITECT. Note dark coloured mortar for dark masonry units and light coloured for light units.

.1 Lintels

In masonry unit partitions, at CONTRACTOR's option, unless otherwise shown on Drawings, constructed by filling top and bottom cells of first course over openings with a 1:2:4 concrete mix and reinforced with not less than four 1/2" rods full length of lintel.

Lintels shall extend at least 8" on either side of opening.

.2 Control Joints

In masonry walls shall be spaced not more than 25'0" apart in long walls, and at concrete columns or walls which intersect masonry walls. **Caulk and seal with an approved flexible joining compound.**

.3 Joints

In masonry walls which are to receive stucco finish shall be raked in an acceptable manner to insure a good bond for the stucco.

.4 Setting Block

Pre-deflections of beams or slabs carrying walls and partitions: Materials for partitions and walls shall be assembled adjacent to supporting structural members for such walls in order to predeflect this member before the wall is built.

.5 Cavity Walls

At all ends and openings, the cavity shall be sealed off with return blocks, such that the cavity is not accessible. In straight runs, return blocks shall form counterforts every 2m on centres.

.3 Cutting and Patching

Cutting and/or patching of masonry required to accomodate work of other trades shall be performed by skilled/mason/machines, as required by the General Conditions.

.4 Unfinished Work

Unfinished work to be stepped back for joining with new work; toothing may be restored to only when specifically approved by the ARCHITECT. Before new work is started, all loose mortar shall be removed and the exposed joint thoroughly wetted.

.5 Protection

Surfaces of masonry not being worked shall be properly protected at all times during the construction period operations. At such time when inclement weather is imminent and the work is discontinued, the tops of exposed masonry walls and similar surfaces shall be covered with approved strong waterproof material securely anchored in place. The sense of this sub-paragraph shall be interpreted to mean that the responsibility for the protection of CONTRACTOR's work against damage or injury from any cause whatsoever, within the reasonable

limits of his control, throughout the entire period of construction and upto the date of Final Acceptance of his work, is hereby determined to be solely his and he shall likewise be held to be fully accountable therefore, in the event that unanticipated rain, snow or freezing weather should injure or damage such work as to require, in the judgement of the ARCHITECT, its replacement with new material of like, kind, quality and workmanship without additional cost or expense to the OWNER.

.6 Pointing and Cleaning

Upon completion of all work, all holes in joints of exposed masonry surfaces shall be pointed by completely filling with mortar. After pointing, all exposed masonry surfaces shall be wetted and then cleaned with a solution of 10 percent by volume of muriatic (hydrochloric) acid, applied with stiff fibre brush leaving the masonry clean, free of mortar daubs, and with tight mortar joints throughout. Immediately after cleaning, masonry surfaces shall be rinsed down with clean, clear water.

4.4.6 SCAFFOLDING

In all instances throughout course of construction, the CONTRACTOR shall permit other trades to work on and/or use his scaffolding in connection with any operations attached to the installation of their work. Such use shall be made available to them at proper times as mutually agreed upon between them.

4.4.7 GUARANTEE

To be provided in accord with the applicable requirements covering "Guarantees" in the General Conditions of the CONTRACT Documents.

4.4.8 MEASUREMENTS & PAYMENTS:

- .1** Work shall be measured net done as fixed in position, acceptably completed as per Drawings and instructions of the ARCHITECT. Each measurement shall be taken to the nearest 1/2". This rule shall not apply to any dimension stated in descriptions.
- .2** Masonry work will be paid for according to the actual net area in sft., with thickness specified. All openings left in masonry walls greater than 5 sft. in area will be deducted.
- .3** Providing and fixing of all joints, reinforcing bars,

reinforcing bar anchors, dovetail anchors, wire mesh ties, wire ties, corrugated or crimped metal ties, rigid steel straps and special anchors shall not be measured or paid for and deemed to be included in the unit rate of masonry work.

4.4.9. Fairface Bricks

.1 First Class Bricks

- The size of bricks should be 9"x 4 ½"x 3" in regular shape.
- A good brick is well burnt, homogenous in texture and emit clear ringing sound when stuck.
- It should be free from crack.
- It should not absorb more than 1/6th of their weight after being soaked for one hour and should not give sign of efflorescence on drying.
- Its compressive strength varies from 2000 to 3000 psi.
- It must have a frog of ¼" deep to make key.

.2 Special Bricks

- Size as specified
- Uniform in colour, shape, straight edges, fine texture
- holes, air bubbles, lumps, pebbles, stone and particles of lime etc.
- All other as above.

4.5 ROOFING & SHEET METAL

pages 4.5-1 to 4.5-8

4.5.1 SCOPE OF WORK

The work covered by this Section of the Specifications consists of furnishing all plant, labor, equipment, appliances and materials and in performing all operations in connection with installation of insulation and built-up roofing complete, in strict accordance with this Section of Specifications and the applicable Drawings and subject to the Terms and Conditions of the CONTRACT Documents.

4.5.2 MATERIALS

.1 Bitumen for roofing shall be approved asphalt with the following characteristics:

	<u>Min</u>	<u>Max</u>
.1 Softening Point.	85°C	96°C
.2 Volatility 163°C, 50g. 5hrs.	-	3%
.3 Penetration at 25°C, 100g. 5sec	10	20
.4 Flash Point (open cut)	260°C	-
.5 Specific Gravity at 16°C.	0.900	1.030
.6 Solubility in carbon tetrachloride	99%	-
.7 Sulphur.	-	1.5%
.8 Susceptibility factor.	55	-

(Penetration 4°C divided by the penetration 25°C and multiplied by 100).

.2 Asphalt priming oil shall be made by the manufacturer of the asphalt.

.3 Felt shall be an asphalt impregnated type IC fibre base felt as per BS-747. The number of plies shall be as specified in the Drawings or Bill of Quantities or as approved by the ARCHITECT.

- .4 Pea gravel shall be stone chips or well-worn, washed river gravel and shall be clean, dry, opaque, and ranging in size from 6mm to 12mm uniformly proportioned.
- .5 Copper sheet shall be soft(roofing temper), 5-6.5 kg/sq.m when laid.
- .6 Wood sheathing and battens shall be, unless specified otherwise, of shiplap sheathing, well seasoned and adequately protected against termites, rot, etc.
- .7 Nails shall be of the size and type recommended by the roofing manufacturer for the job conditions, of copper or copper alloys.
- .8 Expanded polystyrene shall be of the type as approved by the ARCHITECT, conforming to BS-2972:1961. The adhesive for Expanded Polystyrene shall be as specified by the manufacturer of polystyrene or as approved by the ARCHITECT.
- .9 Cement and aggregate shall be in accordance with Section 4.2 of these Specifications.
- .10 Samples of all materials proposed for use under this Section shall be submitted to the ARCHITECT for his approval.

4.5.3 PREPARATORY WORK

- .1 Treated wood nailing strips 25mm thick shall be embedded in uninsulated cast-in-place or precast roof decks at rakes, eaves, and around large openings, so that flanges of gravel strips edging strips, large vents, etc., may be properly secured to deck during the application of the roofing.
- .2 All metal gravel strips, scuppers and roof drains shall be placed and metal flashing, flanges, etc., provided in time to be installed alongwith the roofing assembly. Cant strips shall be installed at the angle formed by roof deck and vertical surfaces.
- .3 All surfaces to be roofed shall be broomed clean and dry. Roofing shall not start unless the preparatory work has been inspected and approved by the ARCHITECT.

- .4 When the slope of non-available concrete deck exceeds one in six, 25mm x 50mm treated wood nailing strips shall be embedded in the concrete with surface flush with the deck. Nailers shall be spaced 1m on centres, and may be installed either parallel or at right angles to the slope. Roofing felt shall then be laid at right angles to the nailing strips and each blind nailed into each nailer. For slopes between one in twelve and one in six on concrete decks in areas of high temperature, provided nailer at ridge, apply felt parallel to slope, and blind nail upper ends securely into wood nailers.
- .5 Joints of precast concrete panels shall be grouted smooth with cement mortar 1:3.

4.5.4 APPLICATION OF ROOFING

- .1 Asphalt for built-up roofing shall not be applied when it is above 205°C, nor shall it be heated above 245°C.
- .2 Felt shall be stacked in properly protected piles and maintained at temperature of at least 10°C for a period of not less than 24 hours prior to laying. Felt and the gravel surfacing material shall always be dry when applied. Asphalt shall be hot when applied and the several layers of felt shall be laid free from wrinkles or buckles.

Over Foam Concrete insulation lay down built-up roofing in strict accordance with manufacturer's recommended practice to ARCHITECT's approval.
- .3 Built-up roofing shall consist of layers of asphalt priming oil, bituminous paint and felt as specified by the ARCHITECT. Roofing shall not be applied during rain or while surfaces are damp; it shall be applied only to surfaces that are clean and dry.
- .4 Method of laying the different layers of built-up roofing shall be strictly in accordance with the instructions of the ARCHITECT .
- .5 Built-up roofing shall be laid when the temperature, at the location of the Work, is below 5°C.
- .6 Heating of asphalt shall be strictly regulated by means of an accurate thermometer of approved type, kept constantly suspended in the heating kettle while the Work is in progress.

- .7 Entire deck surface and parapet walls shall be painted with concrete primer and allowed to dry thoroughly. Primer shall be kept 50-75mm" back from joints of pre-cast panels.
- .8 Mopping of surface with asphalt shall be performed so that the surface shall be completely covered, Bond coats of asphalt shall be at the rate of 1.5 kg/m². At no point shall felt touch felt, or underlying concrete and the rate of application shall be such that the bitumen mopping shall not be more than one feet ahead of the roll of felt. All asphalt shall be applied with mops except that the hot surfacing application shall be poured from a dipper.
- .9 Felt shall be laid with each sheet lapping the preceding one as required to provide the number of piles specified. Each sheet shall be lapped 750mm with an exposed lap of 215mm. All end laps shall be 100mm minimum. The laying of felt shall, in general, be started at low point, working upward to high point to surface, and using split sheets as necessary to secure the required number of plies and laps. Roll all roofing felt after the mop as it spreads the asphalt, rubbing and pressing the sheets into the asphalt from the centre outwards to edges so as to ensure thorough sticking and smooth, firm surface, free from wrinkles or buckles.

The first two piles to roofing shall be extended 150mm beyond the edges of roof legs of the gravel stops and shall be covered with two additional plies of felt, 400mm and 450mm wide respectively, and each cemented in place with bitumen.

- .10 A flood coat of asphalt shall be applied over the top or toplayer of felt at the rate of 2.5 kg/m² of area shall be embedded therein.
- .11 There shall be two types of base flashings:
 - .1 Where built-up base flashing are required, they shall be made by continuing the built-up roofing upon the cant and securing the top edge with galvanized roofing nail used with metal discs. The nails shall be spaced not over 100mm apart.
 - .2 Where metal base flashing occur, apply three layers of felt, extending up on the vertical surface 150mm and out on the roof surfaces 100 - 150mm respectively, cementing the same in place with asphalt plastic, trowelled on. These three flashing strips shall be applied over

the top ply of roofing and under the metal base flashing. The portion of metal flashing extending out over roof surfaces shall be covered with two additional plies of felt, 375mm & 425mm wide respectively and both cemented in place with bitumen.

Over the felt a flood of Bitumen P.B.4 at 2.5 kg/m^2 . shall be applied and pea size gravels @ $0.01 \text{ m}^3/\text{m}^2$. shall be sprinkled evenly and penetrated into the flood coat of Bitumen P.B.4. Weight of 3-ply and 2-ply standard roll of 24 x 1 yards should be 90-100 lbs. and 70-80 lbs. respectively, or nearest metric equivalent.

4.5.5 MEASUREMENT & PAYMENT

Work shall be measured net acceptably completed and as applied in position conforming the Drawings and the instructions of the ARCHITECT. Each measurement shall be taken to the nearest 1/2". However, this rule shall not apply to any dimensions stated in descriptions. Waterproofing/insulation and built-up roofing, except where otherwise stated shall be measured as the net actual visible area of the treated surface in m^2 describing the quality and type of treatment.

4.5.6 FOAM CONCRETE

.1 SCOPE OF WORK

This Section of the Specifications consists of furnishing all plant, labour, appliances, equipment and materials, and in performing all operations in connection with the supply and placing of Foam Concrete in accordance with this Section of Specifications and the applicable Drawings, and subject to the Terms and Conditions of the CONTRACT Documents. Foam Concrete is required for the purpose of providing insulation against heat and to act as filler to raise a particular floor by reducing dead load.

.2 MANUFACTURE

The Foam Concrete shall be produced by a mixture of cement, sand (if required), water and air entraining agent such that the amount of air entrainment shall be at least 70% by the volume and that the unit weight of such Concrete shall be within 1500 kg/m^3 . The unit weight, and air content shall be measured through "Standard Method of Test for Unit Weight, Yield, and Air Content of Concrete" ASTM C.138-74.

.3 PRODUCTION

The air may be whipped into the mass by rapid agitation together with addition of air entraining admixtures such as Sodium Laurly Sulphate, Alkyl Sulphonate, certain soaps resins or other approved agents.

.4 PLACING

At the time of placing the temperature must not be 15°C or less and falling, although it may be placed if the temperature is 15°C and rising. It should not be placed in rainfall.

.5 CURING

Foam Concrete shall be moist cured for at least seven days and allowed to air, dry, prior to the application of moisture proofing material.

.6 METHODS OF MEASUREMENT

The payment shall be made on dried and hardened volume of the concrete in cubic feet.

4.5.7. TERRAZO IN SITU FLOOR

The sub-floor shall be cleaned of all laitance, dirt and extraneous matter. It shall be cleaned twice with clear water till the sub-floor is spark clean. The sub-floor shall be kept continuously moist for 4 hours before the concrete bed is placed.

The floor shall be divided into panels for providing contraction joints as shown in the drawings or specified by the Consultant. Unless otherwise specified, the area of a panel shall not exceed 16sft. The temporary dividers may be metal strips or wooden battens whose edges shall be straight, true and sharp. The top of the dividers shall be perfectly level with the desired level of finished floor. The sequence of casting in the panels shall be on 'checker-board' plan. The complementary panels shall not be cast till the divider strips are removed and 48 hours elapse since the casting of the adjoining panels. If the materials for divider strip is absorbent it shall be moistened or oiled with non-staining grease before the flooring may come in contact with it.

A bed of plain cement concrete shall be laid on moist sub-floor. The proportion of mix shall be 1:2:3 using medium sand and 3/8" down stone

chips as coarse. Next the topping coarse proper shall be laid. The topping coarse shall be composed of marble chips, marble powder and cement (mix of white and grey cement to be specified) mixed dry in the proportion 1:5:0:25:1 by volume in which water shall be added gradually in order to make the mix plastic but not too wet. The flooring shall be unless otherwise specified. A sample of terrazzo (1'x1') shall be prepared for ARCHITECT'S/ CONSULTANT'S. The grading of marble chip shall, unless otherwise specified, be in two fractions, 2 parts 3/16" down and 1 part 1/16" down approved before starting terrazzo work. The thickness of topping shall be 3/8". The mixture shall be poured into panels formed by temporary strips along contraction joints and it shall be rolled into a compact mass by using a heavy stone or metal roller until all superfluous cement and water extracted.

The surface shall then be hand trowelled to an even surface flush with the top of the strips. The finished surface shall show 70% marble granules. The floor shall be kept moist throughout these operations and when the operations are complete, it shall be cured for at least 10 days.

After curing the floor shall be polished manually or with surface grinding machine. The first grinding shall be done with a coarse carborundum stone (80 Grit) and fine sand sprinkled over the surface, using water freely. The floor shall be cleaned twice with clean water after the first grinding is done. All pores and holes shall next be filled with white cement grout. After 5 days the second grindings shall be done using grinding machine or manually, using a fine grain carborundum stone (120 Grit) The surface shall then be cleaned twice using clean water and a light grout of pure white cement shall be spread over the entire floor and be allowed to fill in all fine voids.

After the grout has hardened for 3 days the surface shall be subjected to final grinding with machine or manually with carborundum stone 240 Grit. The floor shall be washed thoroughly after each grinding and in the final grinding washing shall be done with hot water and pure soft soap.

After washing, cleaning and drying the floor after final grinding oxalic acid power shall be dusted over the surface (2/3 lb. Per 100 sft.) The floor shall then be sprinkled with water and rubbed hard. The operation shall be repeated till the surface has acquired the required gloss. The following days the floor shall be wiped with a moist rag and dried with a soft cloth. A hot wax and bee wax (3:1) shall then be applied to the surface and thoroughly rubbed in with hand and later again rubbed with clean cotton waste using 4 passes. This rubbing will be continued till the

floor ceases to be sticky. Best result will be obtained with a minimum of wax and maximum of rubbing.

.1 Terrazzo Tiles

The specification for this item is to terrazzo and situ floor except as stated herein after. Terrazzo Tiles shall be made by machine of the same size and colour as approved by the ARCHITECT/ CONSULTANT.

Instead of bedding concrete mentioned above bedding mortar of proportion 1:2 using medium sand shall be used. The bedding mortar shall be placed in the dice over which the mortar topping shall be placed and pressed hard by rotating the ball press. The green tile shall be dried and cured by dipping in water for 7 days. The tiles then shall be dried and kept ready for laying in floor with sand cement mortar to proper level and grade. The tiles after laying over mortar shall be cured for 7 days by soaking with water before starting grinding and finishing stated above for situ terrazzo.

.2 Skirting Work in Terrazzo

The specification for this item shall be same as that of floor finish work in Terrazzo-in-situ, except and provided as hereinafter.

The wall on which the finish would be applied shall have to be cured for an adequate period. The surface shall be scrubbed with steel brushed using clean water generously and the surface shall be brought to a speak clean condition. In case of brick work the mortar joints shall be raked at least 3/8" deep. The wall shall be saturated with water and kept moist continuously for 8 hours before the work is to begin.

4.5.1.A. TERRAZO IN SITU FLOOR

Pages 4.5.-1 to 4.5.3

4.5.1 SCOPE

The sub-floor shall be cleaned of all laitance, dirt and extraneous matter. It shall be cleaned twice with clear water till the sub-floor is spark clean. The sub-floor shall be kept continuously moist for 4 hours before the concrete bed is placed.

The floor shall be divided into panels for providing contraction joints as shown in the drawings or specified by the Consultant. Unless otherwise specified, the area of a panel shall not exceed 16sft. The temporary dividers may be metal strips or wooden battens whose edges shall be straight, true and sharp. The top of the dividers shall be perfectly level with the desired level of finished floor. The sequence of casting in the panels shall be on 'checker-board' plan. The complementary panels shall not be cast till the divider strips are removed and 48 hours elapse since the casting of the adjoining panels. If the materials for divider strip is absorbent it shall be moistened or oiled with non-staining grease before the flooring may come in contact with it.

A bed of plain cement concrete shall be laid on moist sub-floor. The proportion of mix shall be 1:2:3 using medium sand and 3/8" down stone chips as coarse. Next the topping coarse proper shall be laid. The topping coarse shall be composed of marble chips, marble powder and cement (mix of white and grey cement to be specified) mixed dry in the proportion 1:5:0:25:1 by volume in which water shall be added gradually in order to make the mix plastic but not too wet. A sample of terrazzo (1'x1') shall be prepared for ARCHITECT's/ CONSULTANT's. The grading of marble chip shall, unless otherwise specified, be in two fractions, 2 parts 3/16" down and 1 part 1/16" down approved before starting terrazzo work. The thickness of topping shall be 3/8". The mixture shall be poured into panels formed by temporary strips along contraction joints and it shall be rolled into a compact mass by using a heavy stone or metal roller until all superfluous cement and water extracted.

The surface shall then hand trowelled to an even surface flush with the top of the strips. The finished surface shall show 70% marble granules. The floor shall be kept moist throughout these operations and when the operations are complete, it shall be cured for at least 10 days.

After curing the floor shall be polished manually or with surface grinding machine. The first grinding shall be done with a coarse carborundum stone (80 Grit) and fine sand sprinkled over the surface, using water freely. The floor shall be cleaned twice with clean water after the first grinding done. All pores and holes shall next be filled with white cement grout. After 5 days the second grindings shall be done using grinding machine or manually, using a fine grain carborundum stone (120 Grit) The surface shall then be cleaned twice using clean water and a light grout of pure white cement shall be spread over the entire floor and be allowed to fill in all fine voids.

After the grout has hardened for 3 days the surface shall be subjected to final grinding with machine or manually with carborundum stone 240 Grit. The floor shall be washed thoroughly after each grinding and in the final grinding washing shall be done with hot water and pure soft soap.

After washing, cleaning and drying the floor after final grinding oxalic acid power shall be dusted over the surface (2/3 lb. Per 100 sft.) The floor shall then be sprinkled with water and rubbed hard. The operation shall be repeated till the surface has acquired the required. The following days the floor shall be wiped with a moist rag and dried with a soft cloth. A hot and bee wax (3:1) shall then be applied to the surface and thoroughly rubbed in with hand and later again rubbed with clean cotton waste using 4 passes. This rubbing will be continued till the floor ceases to be sticky. Best result will be obtained with a minimum of wax and maximum of rubbing.

.1 Terrazzo Tiles

The specification for this item is to terrazzo and situ floor except as stated herein after. Terrazzo Tiles shall be made by machine of the same size and colour as approved by the ARCHITECT/ CONSULTANT.

Instead of bedding concrete mentioned above bedding mortar of proportion 1:2 using medium sand shall be used. The bedding mortar shall placed in the dice over which the mortar topping shall be placed and pressed hard by rotating the ball press. The green tile shall be dried and cured by dipping in water for 7 days. The tiles then shall be dried and kept ready for laying in floor with sand cement mortar to proper level and grade. The tiles after laying over mortar shall be cured for 7 days by soaking with water before starting grinding and finishing stated above for situ terrazzo.

.2 Skirting Work in Terrazzo

The specification for this item shall be same as that of floor finish work in Terrazzo-in-situ, except and provided as hereinafter.

The wall on which the finish would be applied shall have to be cured for an adequate period. The surface shall be scrubbed with steel brushed using clean water generously and the surface shall be brought to a speak clean condition. In case of brick work the mortar joints shall be raked at least 3/8" deep. The wall shall be saturated with water and kept moist continuously for 8 hours before the work is to begin.

4.5.2. CEMENT CONCRETE FLOORING

pages 4.5.2.1 to 4.5.2.2

1 Environmental Conditions

- a. Do not apply concrete topping/ finishing when temperature is below 5 degree C (41 degree F) Maintain Temperature of concrete topping at or above 12degree C (55dergee F) for at least first 72 hours.
- a. Do not undertake work if area of application is exposed to dry hot winds.

2. Proportioning and Mixing

- a. Measurements of materials by volume shall be of known capacity to maintain consistent proportions. No lumpy or cracked material shall be used. Mixing equipment, boxes and tools shall be clean. Material shall be proportioned as specified or as directed by the ENGINEER. Mixing shall be continuous until ingredients are evenly distributed.
- b. Only limited water shall be used for proper workability. Water cement ratio shall not exceed 0.45 Mix shall be consumed within thirty minutes of mixing. Re-tempering shall not be permitted. Mix which has begun to stiffen shall be discarded.
- c. Mix ingredients shall be thoroughly mixed by mechanical mixer.
- d. Mix for 2" (50mm) thick concrete base shall be one (1) part cement two (2) parts sand and four (4) parts coarse aggregate.
- e. Mix for 1" (25mm) thick concrete topping/ finish shall consist of One (1) part cement. ¼ parts as per hardonate and two (2) parts clean angular stone chip 3/8" (10mm) and down mixed and laid manufacture's recommendation prior to the hardening of concrete base under it.

3. Concrete Finish/ Topping

- a. Where indicated on drawings or schedules provide trowelled fine finish topping of specified thickness true to line and levels as shown
- b. Apply Mix over required area in alternate strips or bays not exceeding 250 sq.ft (25 sq.M)
- c. Leveling shall be carried out immediately after placing, spreading and vibration is complete.
- d. Darbying or Bull Floating shall be done immediately after screeding and shall remove high spots and fill voids left in the concrete surfaces by screeding.
- e. Mechanical Or hard Floating shall commence after bleed eater has

evaporated and concrete has stiffened sufficiently to prevent the working of excess mix to the surface. Floating shall be terminated when the coarse aggregate is firmly embedded below a thin layer of mortar and has produced a surface of uniform texture.

- f. When concrete is sufficiently hard the surface shall be given a steel trowelled finish. The surface shall be dense hard and smooth and free from blemishes.
- g. Topping shall be cured for a minimum of 7 days after finishing through ponding of water between dams of sand.
- h. Screed battens shall be removed after 24 hours and non-absorbent paper placed against exposed edge and floded over finish.
- i. After the floor is dry apply a single application of 10 percent solution of silicate of soda in accordance with manufacture's instructions or as directed by the ENGINEER.
- j. Deviations exceeding 1/8in (3mm) under a 10ft. (3 M Approx.) straight edge applied in all directions shall not be accepted.

4. Skirting

The ingredients of skirting shall consist of one part of cement and four parts of sand (1:4) all well mixed and laid over a base of rough moist plaster of specified thickness. The thickness of skirting shall be ½" (125mm) laid to a total height of 4" (100mm) and finished smooth to the satisfaction of the ENGINEER>

5. Cleaning and Protection:

Prevent accumulation of scraps and debris arising from the work of this section. Maintain premise in a neat and orderly condition at all time. In the event of spilling or splashing material on to other surfaces immediately remove the same and traces of residue, to the approval of ENGINEER.

4.6 GLASS & GLAZING

pages 4.6-1 to 4.6-3

4.6.1 SCOPE

Scope of WORK consists of furnishing all labor, material, setting equipment, scaffolding and performing all operations in connection with installation and setting of all Glass and Glazing complete in every respect, including washing and cleaning thereof after glazing when directed by the ARCHITECT, in strict accord with requirements of this Specifications, the applicable Drawings and subject to the terms and conditions of the CONTRACT documents.

For convenience of CONTRACT and without limiting or restrict the volume or generality to the foregoing, the following items cover basic requirement for location and specified kind, quality and finish.

.1 Glazing to external windows and doors, internal screens and balustrades.

.2 The glazing must be wind and watertight under all conditions with full allowance made for deflections and other movements.

3. Glazing to external windows and doors generally to comprise sealed double glazed units with the following compositions.

Outer leaf cavity:	7.5mm (min) laminated grey tinted Floated glass
Inner leaf:	7.5mm (min) laminated clear float Glass

Actual glass thickness given above may increase to accommodate large pane sizes in accordance with British standard.

4. Glazing generally shall be fully bedded in silicone bedding for security.

5. Internal glazing, unless otherwise stated to be single glazed laminated to toughened safety glass.

All labour and other incidental materials such as glazing compound, shims, glazing clips, securement devices, felt, etc., not specifically referenced above but required to provide a complete, satisfactory and approved installation.

4.6.2 INSTALLATION PERFORMANCE REQUIREMENTS

.1 Sizes of glass indicated in BOQ are actual sizes of aluminum or wooden doors or windows. Actual sizes required shall be determined by measuring all frames to receive glass, and adjusting for all tolerances, laps, etc., required. All glass and mirrors factory labeled on each pane as far as possible and labels not removed until final approval. Glass required and not particularly mentioned or described shall be same as indicated for other similar or corresponding locations.

.2 Glass in metal windows secured in place with appropriate type glazing stops or beads as detailed on Drawings and set on approved type cushions that will permit normal expansion and contractions and furnished as a part of metal windows. In glazing metal windows, the CONTRACTOR shall follow the instructions of metal window manufacturer as approved by the ARCHITECT relative to bedding for installation of glass and setting in glazing compound if so required and approved.

.3 Glazing compound where necessary or required shall be finished in true, even lines, and all surplus material removed from glass as WORK progresses.

.4 Doors to be glazed to have glass set with metal or wood glazing beads.

.5 The difference between width or height of rabbeted opening and corresponding dimensions of glass shall not exceed 6mm overall and glass shall be so centered in openings as to provide uniform bearing on all four edges.

.6 **Setting Mirrors** - Mirrors to be installed without frames on plaster areas with specified mastic, or other approved equivalent, and anchored with at least two "U" clips at the bottom and two "Z" clips at the top of each mirror. Clips are to be firmly attached to wall with approved plugs to be furnished and installed by Mirror Contractor.

.7 Prior to setting of any mirror masonry or plastered wall surfaces, all such surfaces shall be damp-proofed with heavy

brushed-on coat of approved damp proofing material.

.8 Mirrors set on wall without frames to be set with mirror mastic or by other securement devices as approved by the ARCHITECT.

4.6.3 CONDITIONS OF PURCHASE

.1 Samples:

Representative samples of glass and mirrors to be used shall be supplied upon submission of bids. Minimum size shall be 600mm x 600mm for both glass and mirrors.

.2 Washing & Cleaning:

After all glass has been inspected and approved, thoroughly wash and clean all glazed surfaces, inside and outside, including all mirrors, utilizing experienced window washers and complying with all safety requirements set forth by the applicable Building and Labor Departments.

.3 Guarantee:

All mirrors to be guaranteed free from all defects or failure for a period of 15 years after installation.

.4 Broken Glass Replacement:

Prior to Final Inspection or when directed by the ARCHITECT, any and all broken, damaged or imperfect and/or unacceptable panes of window glass and mirrors shall be removed and replaced with intended kind and quality as specified without additional cost to the OWNER for either material or labour.

.5 Protections:

The CONTRACTOR shall be responsible for all kinds of protection to his materials as well as installed WORK prior to handing over to the OWNER. All safety measures to be taken by the CONTRACTOR shall require prior approval of the ARCHITECT.

.6 Payments:

Payments will be made for quantities actually installed. No allowance will be made for wastage due to variance from standard glass sizes or any other reason.

4.7 ALUMINUM DOOR AND WINDOWS

Pages 4-7-1 to 4-7-6

4.7.1 SCOPE

The WORK covered under this section of Specifications comprises furnishing of all labor, plant, equipment, appliance and material and performing all operations in carrying out and in connection with the furnishing, fabricating and fixing of Aluminum Door and Windows and all related items, such as, gaskets for glazing, rollers, latches, fasteners, raw plugs and other items supplied and customarily built in and/or installed, in strict accordance with the Specifications, Drawings and the instructions of ARCHITECT.

4.2 GENERAL

.1 Design Requirements:

All sectional dimensions shown on Drawings are only indicative. The CONTRACTOR shall be responsible to determine the adequacy of these with respect to actual structural and performance requirements. All extrusions shall be adequate strength, not only meet the structural performance, but also to minimize the risk of distortion in the finished surfaces. All extrusions and sheet aluminum to be of 6063-T6 alloy.

Mechanical Finish Non-peculate as fabricated, aluminum Association designation AA M12.

Chemical Finish Etched, Medium Matt, use if Sodium Hydroxide (Caustic Soda) 4 - 6 oz per gal. at 140° - 150° F, for 5-10 minutes, Aluminum Association designation AA C22.

Electro-Chemical Finish "Hard Coat" color anodized in approved color, Architectural Class-I, Minimum coating 0.7 mil. coating with electrolytically deposited color. Treatment with 15% sulfuric acid at 70 ± 2° F, 12 amp.sq.ft., for 60 minutes followed by electrolytic deposition of inorganic pigment in the coating. Aluminum Association designation AA A44.

.2 Protective Coating

Clear water-white mastic type lacquer resistant to mortar and plaster.

.3 Quality of Finish

All surface finished shall be uniform in texture, color and appearance as per the samples approved by the ARCHITECT . Allowance shall be made for exercising all necessary controls, batting or other methods to ensure uniformity in manufacturing, to maintain uniformity surface finishes within acceptable limits.

.4 Expansion

The doors windows and other assemblies are to be fabricated and installed with provision for such expansion or contraction which is likely to occur due to temperature changes during all weather changes without causing buckling or distortion of joints.

.5 Durability

Given regular maintenance the doors, windows etc., shall serve throughout the expected life of the Building, without serious loss of appearance through normal radiation, friction, corrosion, etc. The working parts of the opening windows and doors shall operate without showing undue sing of wear and tear.

.6 Work Sizes

All dimensions given on drawings are between structural openings and/ or between finished surfaces. Allowance shall be made variation due to constructional tolerances. The CONTRACTOR shall be responsible to measure the final dimensions from the SITE before fabrication of doors, windows and other assemblies/ units.

.7 Weather Tightness

Weather tightness and operation shall suit the weather conditions prevailing in Karachi. All doors and windows will be fabricated as completely air and water tight units including gaskets for glazing, weather stripping, latches, locks, bolts, for fixing, etc.

.8 Prototype

A prototype door, window assembly shall be assembled and erected at the SITE for the inspection and approval of the ARCHITECT. The same will be tested for compliance with the Specifications if so required by the ARCHITECT.

4.7.3 WIND PRESSURE

All assemblies must be of appropriate shape, thickness and sections,

to enable them to resist the loads produced by repeated imposed wind pressure. The maximum deflection over clear span of any member shall be such that it does not include cracking in glass panels and render the assembly unsafe. No member shall suffer any permanent deformation. No part of the WORK shall be rattle in use.

4.7.4 AIR TIGHTNESS

The fixed glazed windows shall be as far as possible 100% airtight under all weather conditions.

4.7.5 ACOUSTIC PERFORMANCE

Windows when installed shall provide an average sound reduction of 28dB over a frequency range of 100 3150Hz.

4.7.6 WINDOWS & DOORS FITTING AND FIXTURES

Shall be tempered aluminum stainless steel or other material guaranteed by the manufacturer to be non corrosive and compatible with the aluminum members, hardware, anchors and other components of the windows units. All doors and windows fitting must be adequately support the glass and frame-work and all mechanisms to be stainless steel or aluminum/ Sample of fittings shall be approved by the ARCHITECT. All swing doors to have approved heavy duty floor mounted flush springs and top pivot to have arrangement so that doors stay open at 90° All cover plates to floor spring are to be in aluminum. All doors to have approved locking and master key arrangement as approved by the ARCHITECT. All pivot windows to have approved latch and pull handles and friction pivot arrangement, All sliding windows to have an approved latches and flush pull handle arrangements.

4.7.7 SEALANT

The external joints between the Building openings, windows frames etc. shall be formed to details shown on Drawings and the grooves shall be caulked with mastic sealants. External pointing sealants are to be suitable for the type and exposure of Building. Material shall be **"Silglaze"** by **General Electric** , or approved equal, applied strictly as per manufacturer's instructions and recommendations.

4.7.8 WEATHER STRIPPING

All opening sections must be weather stripped with Neoprene glazing gaskets or similar approved and Polypropylene pile weather stripping around doors to ensure adequate weather proofing. Aluminum glazing beads are to be snap on type without visible fixing, and flexible to allow for different thickness of glass. PVC weather stripping shall not be acceptable.

4.7.9 SAMPLES

Representative samples of sections for doors, windows, anchoring mechanism, embedded parts, fastenings, accessories and other materials to be incorporated in WORK shall be furnished to the ARCHITECT for approval.

4.7.10 WORKMAN SHIP

The workmanship and the precision in assembly and fixing of components for these WORK must be of very high standard. Workmanship of an average standard will be rejected by the ARCHITECT and replaced by the CONTRACTOR at no additional cost to the OWNER. Cutting shall be straight and free from burrs. All joints, arises, recesses, mullions, capping, etc. shall be pump, true and square. All units shall be installed such that they are truly plumb or horizontal and shall line up with adjacent units. Any defective WORK, or any WORK at no additional cost to the OWNER. All items shall be installed plumb, square and level and shall be solidly anchored in a good workmanlike manner in accordance to the manufacturer's instructions and as specified herein.

4.7.11 PRODUCTS DELIVERY AND STORAGE

All assemblies, components, fixtures, etc. shall be delivered to the SITE in a manner preventing any damage during the transportation or storage. The CONTRACTOR shall be responsible for storage of all delivered material in a manner preventing damage. All fabricated door and windows assemblies shall be stacked on edge level bearers and supports evenly. All embedded parts anchors, bolts etc., shall be delivered at SITE suitably marked for identification.

4.7.12 ERECTION AND INSTALLATION

The window and door assemblies shall be fixed throughout in prepared openings. The CONTRACTOR shall include for drill fixing to masonry or to concrete and shall be responsible for assembling composite units, bedding and jointing, with mastic outside and fixing lugs to frames. The units shall be set straight, plumb and level and shall operate satisfactorily after fixing. The window & door assemblies shall not be forced into openings which are out of square or area too small. The opening must show at least 3mm tolerance all around. The installation shall be performed by competent tradesmen in accordance with the approved shop drawings. The CONTRACTOR shall be responsible for all supervision necessary to ensure that the work is carried out in accordance with the approved details, Specifications, Drawings and to the entire satisfaction of the ARCHITECT.

4.7.13 FIXING

The window and door assemblies shall be secured at head, jamb and sill and care should be taken to ensure that the windows are not disturbed when screwing up plugs or fixing screws. Windows frames shall be grouted with cement mortar as instructed by the ARCHITECT.

4.7.14 CHECKING

After installation and glazing, the CONTRACTOR shall check and readjust, if necessary, all items furnished by him under this CONTRACT and the WORK be handed over to the ARCHITECT in perfect operating conditions. The CONTRACTOR shall be responsible for the protection of all material supplied and/ or installed under this CONTRACT prior to its handing over to the ARCHITECT/ OWNER.

4.7.15 PROTECTION

All assemblies and fitting shall be installed after all plaster work is complete and shall suitably wrapped and protected from damage. The CONTRACTOR shall be responsible for damage to any material brought at SITE and all items of WORK shall be handed over to the ARCHITECT in perfect to operating conditions. If any damage is incurred then the damages portions shall be removed and replaced as directed by the ARCHITECT. The portions shall be removed and replaced as directed by the ARCHITECT. the CONTRACTOR shall exercise all care to protect works executed by other trades and not

covered by this CONTRACT. Any damage to these shall be made good and WORK restored to the entire satisfaction of the ARCHITECT.

4.7.16 FINAL CLEANING

The CONTRACTOR shall be responsible for the final cleaning. The WORK shall be handed over to the ARCHITECT. in perfect neat condition. The WORK shall be deemed to be incomplete until the final cleaning is completed to the satisfactions of the ARCHITECT

4.7.17 MEASUREMENT AND PAYMENTS

Unless otherwise specified in the Bill of Quantities all WORK included within the scope of this section of Specifications shall be deemed to be inclusive of but not limited to the cost of all material, accessories and embedded items including raw plugs, brackets, fixtures, locks, hardware, etc. labor and related costs, charges for conveying and installation of all material and accessories.

4.8 CONCRETE, CERAMIC, TERRAZZO & QUARRY TILE FINISHINGS

Pages 4.8-1 to 4.8-10

4.8.1 SCOPE OF WORK:

Consists of furnishing all labor, plant, equipment, appliances & materials, & performing all operations in connection with the laying and/or installation of all Concrete, Ceramic, Terrazzo and Quarry Tile including bases and wainscots of specified materials of like kind and all related items and appurtenances in strict accord with the requirements of Drgs, as specified herein, & subject to the Terms & Conditions of the CONTRACT Documents.

4.8.2 MATERIALS:

.1 Cement

Cement shall be as specified in Section 4.2

.2 Sand

Grading shall conform to B.S.882 Grading Zone-1 and 2 and shall be graded as follows:-

Percentage (by weight) passing

<u>B.S. Sieve</u>	<u>Grading Zone-1</u>	<u>Grading Zone-2</u>
3/8 inch	100	100
3/16inch	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	8-30
No.100	0-10	0 -10

.3 Coarse Aggregate

Coarse aggregate shall be crushed or uncrushed gravel or crushed stone comprising of angular or round in shape and shall have

granular or crystalline or smooth (but not glassy) non-powdery surface free from friable, flaky and laminated pieces, mica and shale and all such matters as may be injurious to concrete. All coarse aggregate shall conform to BSS No.882 and shall be graded as follows:

<u>B.S. Sieve</u>	<u>% Passing by weight</u>
1 inch (25.40mm)	100
3/4 inch (19.05mm)	90-100
3/8 inch (09.35mm)	20-55
3/16inch (4.765mm)	0-10

The aggregate shall be stored d properly constructed paving & bins as directed by the ARCHITECT. There shall be a physical partition between the stockpiles of coarse & fine aggregates. If required aggregates shall be washed and screened to the satisfaction of the ARCHITECT. Sieve analysis of all the aggregates to be used in the Works shall be carried out as and when required by the ARCHITECT. All aggregate shall be approved by the ARCHITECT. Any aggregate not found to be of the specified / approved standard shall be rejected by the ARCHITECT and all such rejected materials shall have to be removed from site without delay. Floors sub-base or base constructed with rejected aggregates shall be dismantled and rebuilt at the expense of the CONTRACTOR.

.4 Stone Ballast

Stone ballast to be used as soling shall comprise of strong, hard, durable stone of the approved size free from impurities, quarry sap, dust, dirt and solubility characteristics. The stone shall be sound, free from laminations and weak cleavages.

.5 Water

Water used for making concrete, curing or any other operations of the Works specified herein shall be fresh, clean and free from organic or inorganic matters in solutions or suspension. Only water of the approved quality shall be used for all construction purposes.

.6 Marble Chips

Marble chips shall have an abrasive hardness of not less than 16, as

determined by the test report BMS-98. Size shall vary from No.0 to 5.

.7 Cleaning Compound

The compound used for all cleaning of terrazzo shall be an approved neutral chemical cleaner free from acid and strong alkali. Material that will effect the color or else damage the terrazzo shall not be used.

.8 Preservative Materials

Preservative treatment for terrazzo floor shall produce a waterproof finish which will not be impaired by immersion in water at room temperature for a period of 2-1/2 hours. Approximately 18 hours after the floor is finished by buffing, as specified. The preservative material shall not discolor the terrazzo nor leave a tricky or sticky finished film on the surface after buffing.

.9 Ceramic Tile

Ceramic Tile for Toilets and Kitchen shall be of **local make ceramic tiles as mentioned in drawings** or approved equal.

4.8.3 CONCRETE FLOORING:

The materials for cement concrete flooring shall be same as already specified under Section 4.8.2 (MATERIALS).

.1 Composition of Concrete

Concrete shall be composed of Portland Cement, sand, coarse aggregate & water, all well mixed and brought to the proper consistency. The CONTRACTOR shall mix the ingredients as shown on Drawings. The proportions of the various ingredients shall be determined from time to time during the progress of the work and tests shall be made of samples of the aggregates and the resulting concrete. The mix proportions and appropriate water-cement ratio will be determined on the basis of the production of concrete having required workability, density, impermeability, durability and required strength.

.2 Mixing Concrete

The concrete ingredients shall be mixed in a batch mixer for not less than 1-1/2 minutes after all ingredients, except the full amount of water, are in the mixer. The ARCHITECT reserves the right to increase the mixing time when the charging & mixing operations fail

to produce a concrete batch throughout which the ingredients are uniformly distributed & the consistency is uniform. The concrete shall be uniform in composition & consistency from batch to batch except when changes in composition or consistency are required. Water shall be added prior to, during & following the mixer charger operations. Excessive over mixing requiring the addition of water to preserve the required concrete consistency will not be permitted. The concrete ingredients shall be mixed by the volumetric measurement in purpose made gauge box approved by the ARCHITECT.

.3 Constructions

The base course of the floor shall comprise stone ballast of 50mm mesh size. The base course shall be thoroughly compacted by suitable power rammers to the total consolidated thickness as shown on the Drawings and approved by the ARCHITECT. Intersections shall be filled with smaller size stones. The base course shall be blinded with sand and the whole surface watered. Over the well compacted base course a layer of concrete of the required grade and thickness shall be laid in panels of the sizes as indicated on the Drawings and approved by the ARCHITECT.

Concrete bed, after having been cured, as directed by the ARCHITECT, will be roughened and well watered before floor finishing is laid. The floor finish shall compose of cement concrete of required grade and shall be laid in panels to the required thickness as shown on the Drawings and/or as directed by the ARCHITECT. The concrete after laying will be thoroughly rammed and mortar worked upto the top and smoothed with a steel trowel. The edge of each section into which the floor is divided will be defined by 3mm glass strip of a depth equal to the depth of floor finish concrete. Completed floor portions as finished shall be covered with thoroughly damped empty gunny bags or a layer of sand, as directed by the ARCHITECT.

4.8.4 TERRAZZO FLOORING:

.1 Mix

The terrazzo mixes shall be composed by weight as follows:

Plain terrazzo for all floors & bases indicated as terrazzo and not otherwise specified, shall be composed of one part cement & 2 parts of marble chips of the sizes & colors hereinafter specified.

ARCHITECT, reserves the right to alter this composition, and to specify any ratio of white cement to grey, depending upon the approval of samples prepared by CONTRACTOR. For the purposes of tendering, CONTRACTOR will quote for 100% white cement.

.2 Preparation for Terrazzo

The grade and thickness of concrete (as specified in "Concrete" Specifications) shall be laid as underbed to receive terrazzo so that suitable texture to bound to the terrazzo finish, as approved by the ARCHITECT. If the surface is too smooth it shall be roughened with a toothed chisel and, prior to laying the terrazzo shall be cleaned of all dirt, oil, grease and extra loose material.

.3 Division Strips

Terrazzo floors and bases shall be divided by glass or aluminum strips. The division strips between filed work and borders shall have exposed tops in full width of the strips. The division strips shall be set immediately after the spreading of the underbid, the strips being partially embedded therein, securely anchored to the sub floor & grouted solid. All division strips shall be set, straight to lines and to the proper level to ensure that the tops of the strips will show uniformly after grinding and smoothing operations are completed and joints and intersections shall be fitted tight. Strips shall be braced to prevent bulging during the placing terrazzo.

Unless otherwise shown on the Drawings, the divisions in field work of large areas shall be such that no dimension of any panel exceeds 1200mm.

Edging strips shall be placed at door ways between terrazzo and type of flooring and along the edges of all terrazzo bases or border and adjoining other types of floor finishes or floor covering. The edging strips at door ways shall be placed in line with the step face of doors. All edging strips shall be anchored and grouted solid in the underbid or to the concrete sub-floor and braced to prevent bulging as specified for division strips.

.4 Laying Terrazzo

.1 The sub-surface shall be swept clean, thoroughly moistened, not saturated, and slushed with a coating of neat cement grout approximately 1.5mm in thickness. The underbed consisting of one part Portland cement in 4 parts of coarse-screened sand shall be

spread and brought to a level not less than 13mm below the finish floor. The dividing strips shall be installed in the green underbed. The terrazzo mix shall be spread tamped and rolled into a compact mass not less than 13mm thick. After rolling additional aggregate mix shall be sprinkled over the surface to fill up all depressions, to take up excess moisture and to permit the terrazzo to be trowelled to a level, dense and even surface, slightly above the finish line of floor. This level, shall allow for the surface grinding necessary to expose the specified area of aggregate, and to produce smooth, level floors free of waves and depressions.

.2 Seasoning

The completed terrazzo shall be seasoned for 6 days during which time it shall be kept moist and free of traffic. During curing, following shall be arranged:

(1) covered with approximately 25mm thickness of sand; or (2) covering with building paper or mats; or (3) sprinkling with water.

.3 Surfacing

Following the curing period, the terrazzo shall be machine grinded to a true even surface using a #24 grit followed by a #80 grit of finer abrasive stone. After the first grinding, the floors shall be thoroughly grouted with the same cement and color composition as specified for the matrix of the terrazzo mix. The grout shall be of the consistency of thick cream, and shall be brushed over the floor to eliminate all impressions and thoroughly fill the surface for final grinding.

.4 Finishing

In the later stages of grinding, the grit stones or other abrasive used in the grinding machine shall be of a grain or fineness that will give the surface smooth finish. Small areas, inaccessible portions and corners which cannot be reached by the grinding machine shall be ground and rubbed by hand. Finish of surfaces shall then be checked for voids, open mortar joints and repointed with grout equal in color to that in original grouting operation. Surfaces shall then be thoroughly cleaned and grounded and polished to a full gloss and again polished with an approved sealing material.

.5 Protections

The walls and all surfaces of the finished work of other trades shall be properly protected from damage and spoiling during the process of grinding and washing of the terrazzo. After the finish grinding has

been completed and the surface treatment applied, the terrazzo work shall be covered and protected with material approved by the ARCHITECT until completion of the Works of all other trades.

.6 Cleaning and Coating

Prior to the placing of the protective covering, or if approved by the ARCHITECT, after the work of all other trades has been completed and the protective covering removed, all terrazzo work shall be washed with cleaning compound, mixed with warm water and using a fine abrasive where necessary to remove any stains or cement smears. The terrazzo shall be allowed to dry thoroughly and shall be given a sealing application of preservative material. The sealing preparation shall be applied in accord with manufacturer's directions, leaving all terrazzo work in clean condition.

.7 Dado/Skirting

The ingredients of dado/skirting shall be one part of cement and two parts of marble chips varying from No.0 to 2. Skirting shall be laid over a base of plaster of specified thickness. The thickness of dado/skirting layer shall be as specified. The surface shall be grinded and polished to the satisfaction of the ARCHITECT.

.8 Waxing

After cleaning shall follow waxing of the terrazzo surface as per manufacturer's recommendation approved by the ARCHITECT.

4.8.5 INSTALLATION OF TILE FLOORING:

- .1 The base shall be prepared by laying cement concrete of specified grade and of thickness shown on the Drawings, or specified in the Bill of Quantities.
- .2 The terrazzo tiles will be laid to the required levels and grades over a setting bed of cement and sand screed 1:6 comprising of one part cement and six parts of sand by volume. The thickness of cement and sand screed shall be as per Drawings.
- .3 Ceramic and Quarry Tiles shall be laid on concrete base cement sand mortar of specified grade and the joints filled with neat white or grey cement including vertical and horizontal curriers.
- .4 The curing period of the setting bed shall be as directed by the

ARCHITECT. As large an area of setting bed shall be spread at one time as can be covered with tiles before the mortar has set. Surplus mortar shall be removed. The thickness of setting bed in any space shall not be less than 12mm.

- .5 Floor and wall surfaces to receive the tiles shall be thoroughly cleaned of all dirt, dust, oil and other objectionable matters. Tiles shall be laid out from the centre line of each space in an outward direction and the pattern should be symmetries with a minimum number of cut tiles. Joints between the tiles shall be of uniform width. Tiles shall be cut with a suitable cutting tool and rough edges shall be rubbed smooth. Tiles shall be laid to the straight edges.
- .6 After seven days the terrazzo tile floors shall be machine ground to a true even surface using various grades of abrasive stones as required and directed by the ARCHITECT. After the first grinding the floor shall be grouted with same color composition as used for its manufacturer.
- .7 Joints between the tiles shall be of minimum width. Tiles shall be cut with an approved cutting tool and rough edges shall be rubbed smooth. Tiles shall be laid to straight edges.
- .8 The tile floor should be kept wet for at least 72 hours and no one should be allowed to walk on the tiles during that period.
- .9 Freshly placed concrete floor shall be protected to prevent loss of water by covering with damp hessian, water proof paper, damp sand or other approved materials, and shall be kept constantly damp for a period of four days or longer after concreting as directed by the ARCHITECT. The concrete shall be allowed to dry out slowly over a period of three days after wet curing is completed.
- .10 Rejection of Faulty or Imperfect Work**
Finished surfaces of both floors and walls when completed, ground and polished, shall in all cases show uniformly distributed exposed granules or chips, free of undesirable blotches of matrix without marble granules or chips. Uneven distribution in either floor or wall surfaces will be required to be resurfaced and/or refinished to Architect's satisfaction.

4.8.6 SAMPLES

- .1 For all types of finishing in this Section, CONTRACTOR will prepare samples to show the work in complete, finished form. The samples for the applications will be of the following minimum sizes, unless permitted otherwise by the ARCHITECT:

Concrete Floor	6m x 6m
Terrazzo Floor/dado	6m x 6m
Ceramic Tile Floor	As directed by ARCHITECT, upto 10m ²

4.8.7 METHODS OF MEASUREMENT OF WORKS:

- .1 Unit rate for floors and floor finished shall be deemed to be inclusive of the following also:
 - .1 Washing, scrubbing and cleaning of base in case of ground floor.
 - .2 Roughening, washing and cleaning of the base in case of reinforced concrete slabs.
 - .3 Dividing into panels, mixing, placing, consolidation, grinding, polishing, waxing & curing of topping concrete & other surfaces.
 - .4 Providing, using and removing of screed battens and use of other tools and plants.
- .2 Works shall be measured net as installed in position as per Drawings and instructions of the ARCHITECT. Each measurement shall be taken to the nearest 10mm. This rule shall not apply to any dimension stated in the description.
- .3 Floors and floor finished, except where otherwise stated, shall be measured as the net actual area of the floors finished surface in sft describing the thickness, proportions and type of the finish.
- .4 The measurement of sand filling, stone soling, concrete bed and floors will be made on the basis of actual volume in m³ occupied by

sand, stones and concrete.

- .5 The measurement of plain concrete, terrazzo, screeding, ceramic and quarry tiles, etc., will be made on the basis of actual area in m²
- .6 Unless specifically stated in the Bill of Quantities, the cost of construction of all sub-floors shall be included in the cost of floor finish and shall neither be measured and paid for.
- .7 Where only fixing in position of items is required of the CONTRACTOR, it will be specifically mentioned in the Bill of Quantities and in this case only the supply of main items will be excluded from the CONTRACTOR's scope of work.
- .8 For Ceramic Tiles, rates shall be inclusive all accessory pieces such as skirting tiles, corner tiles, radius tiles, bull noses, etc.

4.9 PLASTER

Pages 4.9-1 to 4.9-6

4.9.1 SCOPE OF WORK:

Consists of furnishing all materials, labor, plant, equipment and appliances, and performing all operations in connection with the supply and installation of all plastering, whether on concrete, masonry or other surfaces, or on Furring and Lathing, complete in every respect in accord with the requirements of the Drawings, as specified herein, and subject to the Terms and Conditions of the CONTRACT Documents. Without limiting or restricting the volume or generality of the foregoing, it consists of any, all or some of the following items of work:

- .1 Plastering on plain or reinforced concrete surfaces.
- .2 Plastering on masonry surfaces.
- .3 Plastering on metal lath surfaces and suspended metal lath ceilings.
- .4 Exterior plaster on masonry surfaces and metal lath.
- .5 Miscellaneous accessories, related items and appurtenances, screeds, corner beads, cornerite, metal lath stripping, furring strips, etc.
- .6 Cement plaster.

4.9.2 GENERAL REQUIREMENTS:

- .1 Plaster on masonry two (2) coats, on metal lath three (3) coats, composed of lime, and sand, in strict accord with local practice and as specified herein, otherwise conforming to British Standard Code of Practice C.P.211:1949.
- .2 Hangers, furring and lathing shall be installed so as to be level in every respect, and/or plumb and true, and rigidly and securely connected together and to masonry supports. Lathing and furring is not to be installed until the work of all mechanical trades is in place, inspected and approved. Furring, lathing and plastering sub-Contractors shall consult Mechanical Drawings, and Contractor in reference thereto.
- .3 Plastered ceilings shall include beams, soffits, furred spaces drop-

panels, and any other overhead plaster work, including plastering over furring around exposed pipes next to beams, ducts below ceiling levels, in connection with stair soffits, etc., and any exterior furred ceiling spaces. All girders or beams projecting below underside of ceiling slab shall be plastered unless noted otherwise. Plastered walls shall include all vertical surfaces, piers, columns, pilasters, plastered jambs, recesses, drop-panel screens, etc., head of windows and doors. Plaster on walls shall be carried to floor between grounds or base screeds and other fixed equipment unless indicated otherwise. In all rooms or spaces where plastered walls and acoustical treatment are specified. All walls around such spaces or rooms shall be plastered and complete before such ceiling are installed, if ceiling are required to be plastered. Surfaces to be plastered shall be as required by the "Schedule of Finishes" for wall and ceiling surfaces and other incidental plaster work.

Where wood or finishes other than plaster are indicated for finished wall surfaces, scratch or brown coats or approved types of materials shall be applied.

- .4 Surfaces to receive plaster shall be clean and free from defects. Where necessary to reduce suction, masonry surfaces shall be dampened but not soaked, with a fog spray. Regulated ventilation shall be provided. Finish coats shall have a reasonably uniform thickness of approximately 3mm and not less than 1.5mm in thickness at any point. Ceilings to be level and walls straight with arrises slightly rounded. Thicknesses of plaster, from the face of plaster base to the finished plaster surfaces, not to be less than 18mm over metal lath and masonry, except as required otherwise, to bring plaster surfaces in line with adjacent masonry materials. Prior to the removal of scaffolding utilized in connection with installation of ceiling plastering, the CONTRACTOR shall notify the ARCHITECT of his intention to do so in order that final inspection may be accomplished while they are in place. They shall then be removed, as plastering of side walls shall be performed with trestle scaffolds on horses.
- .5 **Portland Cement Plaster** (For all plaster work)
Applied direct to interior masonry and over metal lath where indicated on "Schedule of Finishes".

4.9.3 MATERIALS:

.1 Furring for Suspended or Hung Ceiling

.a General Cooperate with various trades whose work is installed on underside of ceilings, and in the furring of all ceiling spaces where hung ceilings are required. In particular for spacing of all hangers and installation and spacing of channel purlings, runner channels and cross furring which will support light and ventilating units, dropped plaster panels over equipment, furring for ducts that occur below ceilings height where shown on the Drawings, including supply ducts and wiring thereto and hangers for metal suspension systems for the application of acoustical tile. Direct reference shall be made to lighting layout on Mechanical Drawings installed.

.b Hangers 25mm flats or 4.75mm flats or 25mmx25mmx4.75mm angles spaced for estimating purposes not to exceed 1200mm c. to c. in both directions (verified at time of installation), including location of securement devices and/or inserts in concrete floor slab and securely and rigidly attached in an approved manner. Provide any and all additional hangers required in connection with the installation of all access doors or panels and lighting fixtures in furred spaces.

.c Purlins and/or Runner Channels Not less than 38mm channels to support suspended ceilings, insulation, lighting fixtures, ventilating units and ducts.

.d Cross Furrings Not less than 18mm channels, or as approved otherwise spaced not to exceed 340mm c. to c. or to accommodate installation of any ceiling fixtures and metal lath. Purlings and cross furring to be securely anchored, and the hangers bolted tightly to purlins with 9mm bolts. Where purlins are attached with structural members, bars, approved anchors or clips shall be used. Cross furring to be secured to runners with not less than 2 strands or 0.0475 inch dia monel tie wire or other non-corrosive metal wire, looped and end twisted until tightly drawn together.

.e All bars, rods, hangers, channels or angles painted before delivery to Site with an approved type or rust inhabitive bituminous paint.

.f Accessories, including such items as bolts, clips, attachments, fastening and hangers, and all other incidental furring, lathing and

plastering items supplied where necessary to complete installation.

.g All wire to be not less than 0.0475 inch wire, or equivalent, for the proper securement of the members or approved equivalent otherwise.

.h Cornerites and Strip Lath Wherever a masonry or concrete wall abuts against a wall or ceiling beam to be plastered cover angles so formed or surface in same plane with metal lath extending 300mm onto the surface of each plane. At all internal corners, install metal lath "Cornerites", with minimum flanges of 75mm on each side. External corners to have Corner Beads.

.i Metal lath shall be expanded, black painted metal lath weighing not less than 1.8kg/m². The lath shall be laid with the long dimension across the furring channels and wired to channels with #18 ga. wire every 150mm with one tie on side laps between channels. Lath shall lap at sides and ends not less than 25mm. Laps to be over supports only.

.2 Around all door openings in plastered block partitions, provide metal lath securely fastened to the block on both sides of the partition.

.3 Plaster

.a Portland Cement Plaster - Where indicated on Drawings and/or "Schedule of Room Finishes", such surfaces shall be plastered with a 2- or 3-coat Portland Cement Plaster finish, as per Clause 4.9.2.1, the finish coat being troweled to provide a fine sand float finish. or struck with metal comb to give straight vertical lines. All Portland Cement Plaster shall be mixed one part Portland Cement, three parts Sand, and 1/4 part well slaked lime putty, applied in 2 or 3 coats to a total thickness of not less than 18mm. Keep each application moist or damp with a fog spray for a minimum of 48 hours between applications, and last coat (finish coat) kept moist for 72 hours.

.b General Trowel to a hard, smooth finish free of waves or blemishes that would preclude a uniformly true, smooth surface both vertically and horizontally.

Various isolated walls shall be prepared for tile setters where required. All other surfaces to be finished as above.

.c Plaster on Masonry where indicated on drawings Exterior wall surfaces shall be 25mm cement plaster (smooth trowel finish) mixed and prepared in accord with established local practice by skilled plaster workers and applied on best known manner so as to insure a permanently stable and durable surfaces. To mix specified hereinbefore add approved waterproofing compound in strict accord with the manufacturer's directions approved for use.

4.9.4 CUTTING AND PATCHING:

Performed by CONTRACTOR as work progresses and required by other trades for proper installation of their work, and after completion of all work of this Section shall do all patching, replacement or refinishing of any defective material or surface on either exterior or interior of building. The ARCHITECT decision shall be final. (See General Conditions of the CONTRACT Documents.

4.9.5 CLEANING AND REMOVAL OF RUBBISH:

After completion of work herein, the CONTRACTOR shall remove all of his scaffolding, surplus materials, rubbish and debris, and clean or remove all plaster daubs, and stains from all floors, windows, stair, or finished surfaces, to the ARCHITECT satisfaction and approval.

4.9.6 MEASUREMENT AND PAYMENT:

- .1** Plaster work shall be measured acceptably net completed area of the plastered surface in m² including joints, junctions, corners, drip course, edges of thicker plaster required due to any unevenness. Measurement shall be taken to the nearest 12mm.
- .2** Deduction shall not be made for ends of joints, beams, posts, etc., and openings not exceeding 50sft each. In case of openings of area above 0.5m² each, deduction shall be made for the openings. No addition shall be made for reveals, jambs, soffits, sills, etc., or these openings nor for finishing the plaster around ends of joints, beams, posts, etc.
- .3** Plaster on metal lath shall not be measured separately and the cost of finishing metal lath shall be deemed to be included in the unit rate of plaster work.

- .4 Joints, grooves, drip courses, etc., wherever required as shown on drawings, or as directed by ARCHITECT shall be deemed to be included in the rates for plaster.

4.10 CARPENTRY WORKS:
(Mill, Cabinet & Wood Finish)
Pages 4.10-1 to 4.10-8

4.10.1 SCOPE OF WORK:

Consists of furnishing all labor, plant, equipment, appliances and materials, and performing all operations in connection with supply, fabrication and installation of all rough, temporary and permanent wood work, finished cabinet and mill work, construction, assembly and surface finish treatment and building-in of all cabinet type items, complete in every respect, including all related items, supports, etc., of wood or metal, and incidental associated wood work appurtenances, **the supply and installation of all Finish Hardware in connection with finished wood work**, in strict accord with requirements of the Drawings, as specified herein, and subject to the Terms and Conditions of the CONTRACT Documents.

All wood work required to be furnished and installed in connection with finished treatment of exposed interior surfaces or spaces, that is cut, fitted, built-in and finished in building structure is hereby classified as "Mill Work".

All finished mill work that is constructed, assembled and provided with surface finish treatments in a shop outside building structure is hereby classified as "Cabinet Work". Reference to "Surface finish treatment" includes the filling, staining, shellacking or waxing of all Cabinet type wood work, unless noted to contrary.

4.10.2 WORK NOT INCLUDED:

All "form work" in connection with concrete construction work; all carpet securement strips.

4.10.3 MATERIALS AND WORKMANSHIP:

.1 Lumber and Wood: (Rough Carpentry Work)

All lumber and wood for rough carpentry shall, unless approved otherwise, be new lumber, well seasoned, air dried first quality native partal or Garjan, or any other approved specie conforming to requirements thereof of equivalent kind and quality. Wood for blocking, ground, nailing strips, and/or other wood work incident to carpentry and joinery and/or for use of other trades unless specified sound and free

from loose knots, knot clusters or surface knots that would interfere with or preclude the sound attachment thereof and/or securement to other work. Otherwise, general lumber grading requirements shall conform to British Standards 1186 Part I, and/or similar local lumber quality requirements. Wood for shelves and shelving, etc. shall be an approved local wood suitable for painting as approved by the ARCHITECT.

.2 Mill and Cabinet Work:

.1 Specie of Wood Shall be Deodar wood for all items of finished wood and cabinet work required to have paint finish.

.2 Quality and Workmanship All wood for interior finished mill and cabinet work shall be thoroughly air-cured and if possible kiln dried stock, satisfactory to the ARCHITECT.

Only first quality Timber from heart of a sound tree, free from sap wood, the wood being uniform in substance, straight fibre, free from knots, flaws, shakes, or blemishes of any kind shall be used.

All material specified herein shall be product of one mill insofar as practicable. The CONTRACTOR shall submit for approval the name of sub-Contractors for mill and cabinet work called for on Drawings. Only first class cabinet type workmanship will be admissible in execution of this work, performed by artisans skilled in this trade, so as to provide cabinet work of the highest grade, quality, finish and installation as specified and required. Care shall be excercised by careful screening to avoid strong contrasts in color and graining of finished wood for all wood surfaces of trim, paneling, wall facing, etc., so that any one room or wall surface will present a reasonably uniform appearance. All cutting, framing and fitting shall be done as required for accommodation of work of other trades. Use of wood chips, shims, or other shrinkable material for leveling or plumbing will not be permitted in any form. Mortise and tenon joints set in an approved type of water and moisture proof glue with wedges and/or pinned. Shop miters, 100mm or more, to be glued and doweled and/or locked with a metal ring. Miters less than 100mm shall have concealed splines.

No wood work shall be admitted to the building until such times as plastering is entirely dry. All veneered work to be not less than 18mm thick and paneling 4.75mm unless approved otherwise, and constructed as hereinbefore described and/or detailed. Veneering shall be not less than 1mm after sanding, unless otherwise specified. Edge banding shall

in no instance be less than 4.75mm thick.

All veneered work put together with phenolic resin glue by hot plate process and finished veneered wood facing provided with some form of protective finish to be incorporated in the final finish prior to delivery to job, if not finished in shop.

In addition to machine sandings, all interior trim, paneling, and wood work shall be smooth by hand, using "00" sandpaper to give all wood work the required smooth surface for exposed finished treatment and free from machine and tool marks, abrasions, raised grains and other undesirable defects. (See "Special Finishes" as specified hereinafter). All wood work shall be fitted to plaster or other finished work in a careful manner so as not to injure these surfaces in any way. Where plaster or other work is damaged or disturbed it shall be restored to its original state and/or made good without cost to the OWNER at the CONTRACTOR's expense.

.3 Centering, blocking, grounding and furring, furnished and installed for all above items of wood work as specified hereinafter.

.4 Solid Wood Stock and Veneers, etc.

.a Wood Stock Select quality, kiln dried to within 5% of moisture content, straight and true, free from defects that would impair appearance of finished wood, selected for color and graining to match selected veneers.

.b Veneers Flat sliced with minimum heart pattern to match approved samples and cut to eliminate all defects and any imperfections that would provide an objectionable appearance in the ARCHITECT's opinion and to maintain a uniform grain and/or figure throughout, and cut from same flitch for any individual cabinet item surface or door facing. Door surface facings in single lengths, in no instance applied or jointed horizontally.

All veneering for doors and panels and for other veneered members and where one length of material joins another, shall be perfectly matched, and edges of doors and similar members faced to match finish in spaces where edges will show when open.

4.10.4 GENERAL CONSTRUCTION, WORKMANSHIP, ETC:

.1 General

Provide all rough carpentry required and/or necessary for any construction work, ladders, staging, scaffolds, and the like. Provide temporary protection for all masonry and other related items during period of construction, including temporary centers, stair treads, etc. Grounds, blocking, cants, nailing strips and other rough wood work shall be provided for sheet metal work, fabric flashings, and interior wood work required by Drawings.

2. Cutting, Patching and Fitting

Perform all cutting and fitting of work of other trades as required to secure work herein specified, including that for any plumbing, air-conditioning and electrical work, and do all required patching after other trades.

.3 Grounds and Blocking

All wood grounds, blocking, centers, nailing strips, cants, all wood grids for framing, etc., provided as required to secure carpentry, and of sizes required.

Grounds sized and dressed to proper dimensions. Where not otherwise indicated, shall be 18mm x 50mm in size, set to line, square at angles, blocked out as necessary and securely fastened at intervals not exceeding 400mm grounds against masonry units shall be secured in place with toggle bolts. Grounds against concrete shall be secured in place with expansion bolts. Grounds that are not satisfactory shall be taken down and approved grounds reset at CONTRACTOR's expense. Grounds provided behind all wood trim in every instance.

Nailers and cants provided at walls for nailing base flashing. Nailers 50mm thick and secured with steel strap anchors as shown. Nailers for base flashing given a heavy coat of creosote wood preservative and/or of other approved types or bitumastic paint on all surfaces and ends before setting in place. Any surface or wood cut after treatment shall be similarly thoroughly coated.

.4 Rough Hardware

All nails, bolts, screws and any other rough builders hardware or securement devices required to securely fasten all work in place shall be furnished and installed for any work herein.

.5 Miscellaneous Mill Work

.1 The foregoing items are only intended to present the principal items under this Section. The CONTRACTOR shall include and furnish and install all items of Carpentry and Mill work. These are generally indicated on the Drawings, and Shop Drawings of all items and shall be prepared and submitted for ARCHITECT,s approval as previously specified.

.2 Shelving Generally 18mm thick chipboard with solid stock tongued front edges, and supported on cleats secured to walls with expansion bolts in lead sleeves or on wooden framework as required. Where hook strips are required they shall be of similar material and as detailed on Drawings, with double pronged hooks secured in place by the CONTRACTOR as furnished under Section (FINISH HARDWARE).

.3 Drawers Shall have Teak extension slides and/or metal slides with roller bearing, plywood bottoms, solid teakwood boxing, dovetailed and glued. Drawer fronts of solid stock, of selected teak and/or as detailed otherwise on the Drawings and dovetailed to sides and bottom.

.4 Cases and Cabinet Doors Unless scheduled otherwise or detailed on Drawings, hinged doors for cases and cabinets required under work of this Section included and provided with suitable and/or appropriate hardware. Where panels are required they shall be of teak veneer with solid wood stiles and rails or have solid wood edges. Backs of veneered panels may be of unselected teak veneers.

.6 Doors

.1 General All door frames shall be teak or as per drawings veneered of sizes and thickness as indicated on Drawings. Doors shall be flushed, or provided for glazing as required. The CONTRACTOR shall note that certain doors have a different finish on the one side from the other side, but the same kind of wood shall be used on both sides to

prevent warping.

.2 Flush Solid Core Doors Flush doors shall be obtained from an approved manufacturer. Cores shall be laid up with kiln dried core blocks glued together with resin glue; joints between blocks in adjacent rows to be staggered. Teak wood edge strips of same wood as the face veneer, not less than 18mm thick, and be applied to outer edge of stiles and rails at time cores are laid up. Where solid stock moldings are shown, teak wood edge strips shall at the same time be applied to inner edges of stiles and rails of sufficient thickness to provide ample stock after panel groove is cut. No end wood permitted to show anywhere.

All rails shall be doweled to stiles with Teak, dowels 38mm" diameter, and properly grooved. These dowels shall be 125mm long, one-half of the length being in the rails and one-half in the stiles. Dowel holes bored in both stiles and rails shall be of such diameter as to provide a perfectly tight fit for the dowels for their entire length. Dowels shall be 65mm" apart on all joints between stiles and rails.

All flush doors so manufactured shall be allowed to season to remove excess moisture from glue before cross bandlings and any face veneer applied.

Cross banding on flush doors shall be 1.5mm thick and be plate dried before applying to cores to remove excess moisture. After cross banding have been applied to cores and before applying face veneers, they shall be sanded to insure a smooth surface before applying face veneers.

Veneers for flush doors shall be sliced and in no case not less than 1mm thick after sanding.

Sash doors shall be rebated and equipped with stops for glazing and also furnished with muntins where required.

All door stops shall be shipped loose and be secured with adjustable bronze screws and washers at building, furnished and installed by the CONTRACTOR.

Bathroom doors to be Teak wood veneered, flush, solid core, guaranteed not to twist, bend or warp. Face panels shall be three-ply with total thickness of 3mm before sanding. Stile 75mm wide, with 75mm lock blocks, 1m long, centered on both sides. Top rail 150mm

and bottom rail 300mm. Provide 150mm x 150mm block for robe hook (See Drawings for location). Intermediate rails to be 75mm. All other requirements for these doors to comply to requirements for solid core doors.

4.10.5 FINISH HARDWARE

These items as they relate to all Cabinet Work, furnished and installed complete by CONTRACTOR. Finish Hardware for Cabinet Work and Mill Work fixtures shall be of the highest quality products as selected by the ARCHITECT. The CONTRACTOR shall examine same, determining before application that items will perform the function and purpose for which they are intended and apply them in an acceptable manner.

4.10.6 PRIMER, PAINTING AND FINISHING

The CONTRACTOR shall have option of finishing any portions of this work either on Site and/or in a shop. All priming and back painting shall be completed by this CONTRACTOR. All Mill Work primed and painted 1 coat of lead and oil paint, sanding and shellacking all knots, as specified for wood finish (PAINTING) and left in an approved conditions to receive required finish treatments as specified, by Paint Contractor.

4.10.7 REFITTING AND CHECKING

Intermediately before building is occupied, the CONTRACTOR shall examine all doors and other moveable parts of all case and Cabinet Work, to see that all are in perfect operating condition. All edges of doors, including the bottom edges of doors before and after refitting, shall be sealed with approved water resistant materials.

4.10.8 PROTECTION OF FINISHED PRODUCTS, INTERIOR WOOD WORK, ETC.,

It shall be the responsibility of the CONTRACTOR and he shall be held accountable for the explicit protection of all finished Cabinet Work, interior trim and decorative treatment until Final Inspection and acceptance. The ARCHITECT and OWNER reserve right to order replacement at no additional cost to CONTRACT sum, for any and all work so injured, and/or damaged as to be unsightly after repairing and/or finishing. Authorization to repair and/or refinish shall not constitute a waiver of OWNER's right to require replacement of any item or work if unsatisfactory to him after such

repairing and/or refinishing.

4.10.9 MEASUREMENT AND PAYMENT

Door sizes indicated on Drawings shall be considered final and the payment for the Door Frames will be made strictly in accordance with the same on sft basis.

4.11 PAINTING & FINISHING

pages 4.11-1 to 4.11-8

4.11.1 SCOPE OF WORK

Consists of furnishing all labor, painting, equipment, scaffolding, protective coverings and materials, including that classified more in particular as "Paint" hereinafter; and in performing all operations in connection with the field finish painting treatment as such, of exposed concrete wall and ceiling surfaces; all plastered wall and ceiling surfaces, including soffits, sides of furred beams, etc., and the field painting of all exposed interior metal work; miscellaneous and ornamental iron, steel and sheet metal, and exterior wood and mill work, and any other related items of painting and/or finish treatment customarily required to protect and finish the work in strict accordance with the requirements of the Drawings as specified herein and subject to the Terms and Conditions of the CONTRACT Documents otherwise.

4.11.2 GENERAL

Where the word or term "Paint" is used or referred to "as such", throughout the Specifications, it shall be interpreted to mean and include the surface finish treatment consisting of any, all or some of the following items: sealers, primers, fillers, body and final coats, emulsions, varnish, stain or enamels, all as more specifically defined hereinafter as to kind and quality and function for various surfaces and finishes.

All paint and necessary materials incorporated in or forming a part thereof shall be subject to the approval and selection for color, tint or finish by the ARCHITECT. In connection with the ARCHITECT's determination of color or tint of any particular surface, the depth of any color or tint selected or required shall in no instance be a subject for an additional cost or charge to OWNER.

Where a "two color" or tint combination may be selected or approved for the treatment of any particular surface no additional cost shall be made therefore to the OWNER in any instance. Painting of wood, except as specified otherwise, and for finished surfaces shall be 3-coat work including the priming coat. Painting of metal surfaces required to be painted, shall be 2-coat work, in addition to the shop protection coats.

4.11.3 MATERIALS

- .1 The basic materials entering into the compounding and/or manufacture of all paint, varnishes, and other finish treatments referenced herein shall be of the best grade and quality of their respective kinds for the intended purpose. They shall be the products or formulas of recognized and reputable manufacturers of known reliability and integrity, subject to the approval of the ARCHITECT and conform to the applicable requirements of the British Standard Specifications, or approved local Standard of kind, quality and finish.

Painting materials, except where specific formulas are prescribed herein for specific locations, shall be of kind, quality and formula characteristics as compounded by or other approved equivalent paint manufacturers will be acceptable.

- .2 Reference herein to specific paint materials is for the sole purpose of establishing a basis of "minimum standards" of quality and shall not be construed to be a limit of perfection or quality for any of the material ingredients to be furnished or utilized in this work. The ARCHITECT reserve the right to select and/or accept only the best grades of standard products, which in his opinion will provide a finish of recognized performance characteristics suitable for their respective surfaces, irrespective of minimum standards referenced herein.
- .3 All materials shall be delivered to premises in their original unbroken containers or packages and bear the manufacturer's name, label and brand, and formula, and be mixed and applied in complete accord with his directions and/or instructions. The mixing of all paint or other covering finish treatments shall be done on premises, when, as, and if required, under the ARCHITECT's supervision and/or direction. Colors shall be non-fading, and as selected by the ARCHITECT. Colors for finished surfaces shall be resistant to the reaction of lime.

4.11.4 SURFACE PREPARATION

- .1 All oil, grease, dirt, dust, loose mill scale and any other foreign substance shall be removed from the surface to be painted, polished and white washed by the use of a solvent and clean wiping material. Following the solvent cleaning, the surfaces shall be cleaned by scraping, chipping, blasting, wire brushing or other effective means as approved by the ARCHITECT.

- .2 In the event the surfaces become otherwise contaminated in the interval between cleaning and painting, recleaning will be done by the CONTRACTOR at no additional cost.
- .3 Surfaces of stainless steel, aluminum, bronze, and machined surfaces adjacent to metal work being cleaned or painted shall be protected by effective masking or other suitable means, during the cleaning and painting operations.
- .4 All surfaces to be painted with approved quality cement wash paints shall be free from dust, dirt, fungus, lichen, algae, etc. Oil paint, varnish and lime wash should always be removed by scraping and washing.
- .5 All surfaces to be bitumen painted shall be thoroughly cleaned of any accretion, dust, dirt, etc., by scraping wire, brushing out, as directed by the ARCHITECT. The surface shall be primed with a coat of asphalt oil used at the rate of not less than 5 liters per 100 sft.

4.11.5 APPLICATION

- .1 All paint and coating materials shall be in a thoroughly mixed condition at the time of application. All work shall be done in a workmanlike manner, leaving the finished surface free from drips, ridges, waves, laps, and brush marks. All paints shall be applied under dry and dust free conditions. Unless approved by the ARCHITECT paint shall not be applied when the temperature of the metal or of the surrounding air is below 7°C. Surfaces shall be free from moisture at the time of painting.

All primary paint shall be applied by brushing. The first coat of paint shall be applied immediately after cleaning. When paint is applied by spraying, suitable measures shall be taken to prevent aggregation of the paint in the container during painting operation.

Effective means shall be adopted for removing all free oil and moisture from the air supply lines of the spraying equipment. Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied. Surfaces to be painted that will be inaccessible after installation shall be completely painted prior to installation. Only as such materials should be mixed as can be used up in one hour. Over-thinning will not be permitted. After the first coat the surfaces will be soaked evenly four or five times and the second coat shall be applied after leaving for at least overnight.

- .2 All metal doors, windows and ventilators shall be painted with two coats of approved enamel paint over one coat of a red oxide primer as directed by the ARCHITECT.
- .3 Plastic emulsion paint of the approved make and shade shall be applied to all interiors as per manufacturer's instructions.
- .4 Epilac enamel paint of the approved make and shade shall be applied to surfaces shown on the Drawings and as per instructions of the manufacturers.
- .5 Immediately ahead of application, the surfaces shall be dampened with clean water. Thoroseal and clean water shall be mixed as per directions of the manufacturer. A heavy first coat at 1 kg/m^2 shall be applied. This shall be followed by a second brush coat at 0.5 kg/m^2 after the first has set. When finish coat has set, it shall be floated to uniform texture with a sponge float.

4.11.6 EXECUTION

- .1 **Submittals** Color samples shall be submitted on one 400mm x 400mm asbestos cement board per sample showing each type of paint for ARCHITECT's approval. Manufacturer's color charts shall be submitted for ARCHITECT's color selection.
- .2 **Product Delivery** Deliver materials in manufacturer's original unopened containers with labels intact and legible identifying brand names and contents.
- .3 **Job Conditions**
 - .1 Observe manufacturer's recommended minimum and maximum temperature but do not apply paint or finish to any surface unless ambient temperature is 10 degree C. or above and less than 43 degree C. No painting shall be done above 90% relative humidity.
 - .2 Place drop cloths to adequately protect all finished work. Remove and replace all items of finish hardware, device plates, accessories, lighting fixtures or other removable items. In no case shall any finish hardware or other finished items that is already fitted into place be painted, unless otherwise specified by the ARCHITECT.

- .4 Quality Assurance** All paint for any one surface shall be top quality, of one manufacturer and approved by the ARCHITECT. Deep tone accent colors shall be used and the unavailability of final coat colors may be the basis for rejecting materials for any one surface.

4.11.7 METAL DOOR TRIM

- .1** First Coat (over factory baked-on Primer) Standard trim enamel undercoat.
- .2** Second Coat - Metal trip semi-gloss (dull) enamel.

4.11.8 ALL METAL WORK

Except as specified otherwise shall have, in addition to shop primer coats, one coat enamel undercoat and one coat semi-gloss (dull) enamel.

- .1** All exposed, ornamental and miscellaneous interior iron work and metal stair work (except non-ferrous work) shall receive over the shop primer coat, 2 coats of paint as specified herein.
- .2** Galvanized iron not previously shop coated shall receive 2-coat work, the first coat an approved galvanized iron primer and the finish coat an enamel paint.
- .3** Where shop coats and/or priming coats are found to be scratched or abraded they shall be "touched up" with appropriate paint. Iron work shall be spot coated with red lead. Where Iron work is set before plaster "touch up" before plaster is applied.
- .4** All pit and access doors and similar items painted on both sides.
- .5** Butts, overhead door checks, brackets, holders, stops, etc., (except non-ferrous work) for interior doors shall have in addition to gloss-enamel brought down to provide an approved semi-gloss sheen to match adjoining finishes.
- .6** Wall grills, (other than non-ferrous), register faces, louvers access panels, and similar items shall be painted 2 coats of an enamel paint as described under "Materials" to match color or adjoining and/or adjacent surfaces unless directed otherwise.

- .7 Convector and air-conditioning exposed enclosures in finished areas, other than "non-ferrous" and/or those previously final finished, shall be painted over shop primer coat with two coats of paint to match adjacent wall treatment and/or as directed otherwise and approved by the ARCHITECT.

4.11.9 INTERIOR METAL TRIM

Where exposed finished steel items occur and required to be painted, such as kitchen hood, convector fronts, grills or screens, they shall be painted-in with wall or ceiling treatment, after degreasing and priming.

4.11.10 SAMPLES

Prior to the start of the application of any paint and/or finish treatment otherwise, the CONTRACTOR shall apply samples of the required finish treatments to specific representative wall and ceiling surfaces or other areas or surfaces where indicated by the ARCHITECT. The sizes of the sample paint finishes shall be as determined by the ARCHITECT, but generally 100 sft each.

4.11.11 PROTECTION

The CONTRACTOR shall protect the work of all other trades against damage or injury by his employees, or by the materials, tools or utensils used in connection with the work of this Section. Any and all work damaged as the result of the prosecution of this Section shall be repaired at this CONTRACTOR's expense, or if in the opinion of the OWNER and the ARCHITECT it cannot be properly repaired, it shall be replaced with new work by CONTRACTOR without additional compensation therefore beyond the CONTRACT amount. At all times, the general and liberal use of drop cloths shall be a primary requirement for protection purposes.

4.11.12 EXTERIOR CONCRETE SURFACE TREATMENT

A special transparent "Silicone" waterproofing treatment shall be applied on exposed concrete surfaces at the following locations:

- .1 All exterior building walls above grade which separate or exclude air-conditioned and/or ventilated spaces from weather.

- .2 The interior and exterior concrete surface open to sky of Mechanical Room at roof top. Material for this work to be suggested by CONTRACTOR.

4.11.13 TOUCHING UP

Before plastering or painting touch-up exposed metal with red lead. At the completion of all other work specified, all painted work shall be touched up and restored where damaged or defected, and the entire work left free from blemishes, to the complete satisfaction of ARCHITECT.

4.11.14 CLEANING

The CONTRACTOR shall clean all paint, spots, daubs, oil and stain in their entirety from all floors, wood work, glass, hardware, metal work and all similar items, and leave the work in perfect condition upon completion, satisfactory in every respect to the ARCHITECT.

4.11.15 GUARANTEE

To be provided to the OWNER by the CONTRACTOR in strict accordance with the requirements for "Guarantees" set forth in the General Conditions of the CONTRACT Documents.

4.11.16 MEASUREMENT AND PAYMENT

- .1 Unless otherwise specifically stated in the Bill of Quantities or herein, all the work involved within the scope of this Section of Specifications shall be deemed to be inclusive of but not limited to the following:
 - .a CONTRACTOR's establishment charges, overhead charges, profit, interest.
 - .b All other expenses, charges, taxes specified in Conditions of CONTRACT.
 - .c Labor and all costs in connection therewith.
 - .d Use of plant, equipment and machinery and all costs in connection therewith, e.g., mobilization, demobilization, transporting, fuel, energy charges, grease, oil, installing, operating, storing, watching, returning, replacing, handling, maintaining, idle stand, parking, removing damaged,

destroyed salvage.

.e Materials and goods, e.g., marketing, selecting, conveyance, loading, unloading, storing, watching, returning, handling, hoisting, lowering, cutting, jointing, fixing, wastage, destroyed, damaged salvages.

- .2 The cost of all the works involved within the scope of this Section of Specifications as per all the Drawings and Conditions of the CONTRACT Documents are covered only within the quoted rates of items of the Bill of Quantities.
- .3 No payment for preparatory works, scraping, scratching, sand blasting, cleaning, priming, etc., shall be made. The cost of which is included in the relevant painting items.
- .4 Measurement for payment of the acceptably completed work specified herein as white/color/cement washing/bitumen painting, etc., will be made on the basis of actual area in sft of the respective type of painting including scraping, scratching, sand blasting, cleaning, etc., as directed by the ARCHITECT.

4.12 STONE BALLAST/SOLING

pages 4.12-1 to 4.12-2

4.12.1 SCOPE OF WORK

The work to be done under this Section of Specifications consists of furnishing all plant, labour, equipment, appliances and materials and performance of all operations required in connection with construction of stone soling, in strict accordance with the Specifications and Drawings and/or as directed by the ARCHITECT. The scope of this Section of Specifications is covered with detailed specifications as laid down herein.

4.12.2 STONE

Stone to be used shall comprise of strong, hard, durable stone of the approved size free from impurities, quarry sap, dust, dirt and solubility characteristics. The stone shall be obtained from approved quarries and shall be sound, free from laminations and weak cleavages.

4.12.3 CONSTRUCTION

.1 Preparation of Sub-grade

Sub-grade shall be formed of suitable materials free of clods, sod, roots, stumps, brush or other objectionable material.

Sub-grade material shall be placed in successive layers not exceeding 150mm in thickness loose measure, and each layer shall be thoroughly compacted to give the specified density.

The sub-grade will be compacted at optimum moisture content and loose pockets, if any, cut-out and re-filled with selected materials in layers not more than 150mm and formed to levels and grades shown on the Drawings.

Compacting shall be done by approved methods consonant with the soil/material to be compacted.

The maximum dry weight density of the sub-grade shall not be less than

95% of Modified AASHO: maximum density is defined as the maximum dry weight density as determined by ASTM Designation D-1557 (MOD-AASHO).

.2 Stone Ballast/Soling

.1 The stone ballast shall be well graded and broken hard stone of 50mm mesh obtained from an approved quarry.

.2 The soling stone shall be 150mm in size from an approved quarry.

.3 The stone shall be laid and packed to even grades and well rolled using a 10 ton roller to a consolidated thickness of not less than 150mm as shown on the Drawings. The whole of the surface of the compacted stone soling will be blinded with murum or any other approved gritty material, after the interstics have been filled with smaller size stones, so as to effectively fill in the voids and crevices; watered, if necessary, and again thoroughly rolled with the same roller to produce a smooth and even surface free from irregularities and true to line and level. Care is to be taken to avoid any damage to existing structures, mains or pipes while rolling operations is in progress. In places inaccessible for a roller, compacting shall be done by hand tampers weighing not less than 9 kgs or power rammers as directed by the ARCHITECT.

4.12.4 MEASUREMENT AND PAYMENT

The measurement for payment of stone soling acceptably completed as specified in the Specifications and Bill of Quantities will be made on the basis of area in m² occupied by well compacted stone soling conforming to the Drawings or as directed by the ARCHITECT.

4.13 TERMITE CONTROL

pages 4.13-1 to 4.13-5

4.13.1 SCOPE OF WORK

This Section of Specifications covers the provision of Termite Control Treatment in the areas specified in the CONTRACT Drawings and as per Specifications laid down herein:

4.13.2 MATERIALS

- .1 Pesticides shall be solution as specified of mixed in clean water for application in earth, and mixed in pure turpentine for application to wood where such application is required.
- .2 Pesticides as specified shall be obtained from the Government of Pakistan, Department of Agriculture, in sealed drums in quantity necessary for the requirement of works. All mixing shall be done at Site and the proportion of pesticides used shall be verified by the ARCHITECT.
- .3 CONTRACTOR is free to suggest imported chemicals in place of the above if he feels they are better. However any such substitution will be allowed as per relevant clauses of the Conditions of CONTRACT, and sufficient documentary evidence of the quality of such substitute materials will be submitted to ARCHITECT.

4.13.3 EXTENT OF APPLICATION

Pesticide solution shall be applied with approved pressure spraying equipment maintaining a pressure of 10.5 kg/square cm to all applications to, on or in earth.

- .1 All excavation, all walls and bottoms of all pits or trenches for footings or foundations are to be sprayed as shown on the Drawings. Pesticide shall penetrate to a depth of 25mm in porous earth at bottom and 50mm to 75mm" at sides of excavations
- .2 Stock piled excavated materials to be used as back fill is to be treated as above. After back filling to plinth level, the area is again to be sprayed.

- .3 After grading, compaction and levelling and before installation of any soling under slabs, all such areas are to be sprayed with pesticides, penetrating a minimum of 25mm into soil.
- .4 Care shall be exercised to insure that no marks or damage occur to the finished structure as a result of the work under this Section of Specifications.
- .5 All rough wood work for the entire project is to be pesticide treated (before application of solignum in the case of material or receive both treatments). Pesticide shall be sprayed on all surfaces of all the wooden work, viz., door frame blocking, furring, plants, boards, etc., before installation. Spraying is to be done at the Site, after delivery and before installation. No spraying shall be necessary after field sawing, joining or installation of such materials. All spraying will be done within one week of working of the materials.

4.13.4 STANDARDS

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

4.13.5 SAMPLES AND TESTS

The CONTRACTOR shall supply samples of all the materials to be used for pest control for approval of the ARCHITECT and testing in accordance with the specified standards. Rejected materials shall be removed from the Site immediately.

4.13.6 GUARANTEE

The CONTRACTOR is to guarantee that the building shall be free from termites (white ants), wood bores and other pests or rodents which cause damage to wood or other organic materials for 10 (ten) years from the date of acceptance of the building.

In the event of any damage caused within the guaranteed period, the CONTRACTOR shall replace at his own cost such damaged materials, finishes affected and suitably preserve and treat the premises with the best method known to the trade to prevent the spreading of termites.

4.13.7 MEASUREMENT AND PAYMENT

- .1 Unless otherwise specifically stated in the Bill of Quantities or herein, all the work involved within the scope of this Section of Specifications shall be deemed to be inclusive of but not limited to the following:

CONTRACTOR's establishment charges, overhead charges, profit, interest.

All other expenses, charges, taxes specified in the Conditions of CONTRACT.

Labour and all costs in connection therewith.

Use of plant, equipment and machinery and all costs in connection therewith, e.g., mobilization, demobilization, transporting, fuel, energy charges, grease, oil, installing, operating, storing, watching, returning, replacing, handling, maintaining, idle stand parking, removing, damaged, destroyed, salvaged.

Materials and goods, e.g., marketing, selecting, conveyance, loading, unloading, storing, watching, returning, handling, hoisting, lowering, cutting, joining, fixing, wastage, destroyed, damaged, salvaged.

- .2 The cost of all the works involved within the scope of this Section of Specifications as per all the Drawings and Conditions of the CONTRACT Documents are covered only within the quoted rate of the item of the Bill of Quantities.
- .3 Measurement of payment of Termite Control work acceptably completed shall be made in m² of area by measuring and multiplying any two dimensions of breadth/height/depth of sprayed surface.
- .4 No payment will be made for Termite Control treatment on wood work and all costs in connection therewith shall be deemed to have been included in the unit rates of the relevant items.

APPLICATION METHOD AND CHEMICAL

The object of chemical treatment of the soil is to provide a barrier through which termite cannot pass to reach a building. Application method is three stages method.

First stage:

First treatment would be given by treating foundation Pits to make chemical barrier and to avoid termite penetrating from foundation to building.

Chemical Use:

White ant ® Termite Proofer 400 (Chlorpyrifos or approved equivalent)

Other Name: Dursban

1 Liter concentrated chemical make 80 liters of water solution and to cover 160 sft

Second Stage:

Second treatment would be afforded after the earth filling with long lasting termiticide to order to retain lasting residues to kill ant termite, attacking from ground

Chemical Use:

White ant ® Termite Proofer 400 (Chlorpyrifos or approved equivalent)

Other Name: Dursban

1 Liter concentrated chemical make 80 liters of water solution and to cover 160 sft

Third Stage:

Third treatment of Termite would be given in Lawn, Boundary wall, Alleys etc.

Chemical Use:

White ant ® Termite Proofer 400 (Chlorpyrifos or approved equivalent)

Other Name: Dursban

1 Liter concentrated chemical make 80 liters of water solution and to cover 160 sft

Application Method and Chemical at Wood work

Chemical Use:

White ant ® Termite Proofer 400 (Chlorpyrifos or approved equivalent)

Other Name: Dursban

50ml/ Litre of water apply 1 Liter of solution per 40 Sft.

These all treatment should grand a total warranty period of 5 years

4.14 HARDWARE

pages 4.14-1to 4.14-3

4.14.1 SUBMITTALS

.1 Hardware Schedules: Submit to the ARCHITECT for approval a complete and detailed hardware schedule. Schedule shall list the actual product series numbers, lock function, and manufacturer. The CONTRACTOR is required to follow manufacturer's catalog requirements for actual size of door closers, brackets and holders. All door sizes are to be listed in the Hardware Schedule and all hardware shall be in strict accordance with requirements of height, width and thickness. Hardware Schedule shall indicate Architect Hardware Set Numbers for reference purposes.

.2 The selection of locking options for locksets and deadlocks and all other hardware specified herein for this Section will be exercised during this submittal phase of this WORK.

.3 Samples: Submit complete physical working samples of all hardware contained herein for the approval of the ARCHITECT within 90 days following signing of CONTRACT.

.4 The CONTRACTOR shall determine conditions and materials of doors and frames for proper application of all hardware.

.5 Coordination: It is essential that samples and templates be provided correctly and promptly in order that fabricators of doors and frames can include information in their Shop Drawings and samples.

.6 Manufacturer's Listing Form: The CONTRACTOR shall return with his bid one copy of manufacturer's listing form, completely filled in with manufacturer's name and product series number of the products he proposes to furnish on this PROJECT.

4.14.2 GUARANTEE

Guarantee all products against workmanship and operation for a period of **ten (10)** years after installation has been accepted by the ARCHITECT. The CONTRACTOR, at his own expense, will replace faulty products.

4.14.3 STORAGE

Finish hardware shall be received, stored on shelves in room under lock and key.

4.14.4 KEYS AND KEYING

.1 All locks and cylinders under this CONTRACT shall be grand master keyed.

.2 Keying of individual locks and cylinders shall be as directed by the OWNER.

.3 Master keys and change keys shall be delivered only upon instructions from the OWNER.

.4 Keys shall be provided with following information:

- .1 Name of lock manufacturer
- .2 Designation for key blank
- .3 Key code number
- .4 Tag indicating usage

.5 Provide two temporary keys for use during construction for all doors under masterkey system. Temporary keys shall be used until time of substantial completion. Under no circumstances should any masterkeys be used during construction.

4.14.5 TEMPLATES

Hardware cut-outs for doors and frames shall be by templates to be furnished by hardware manufacturer.

4.14.6 HARDWARE SET HEADINGS

General: Except for items whose typical locations are previously described in this section, hardware will be assigned to specific doors as the hardware sets appear in the Door and Frame Schedule. It is the responsibility of CONTRACTOR to accurately furnish the proper sizes,

quantities, weight, and functions as required by these Specifications and as recommended by manufacturer's catalog information.

4.14.7 INSTALLATION AND FITTING

.1 Finish hardware items shall be located and installed according to Drawings.

a. Heights given are measured from the finish floor to centerline of unit.

b. All other dimensions are to centerline of unit.

.2 All units shall be fitted accurately. Fit faces of all mortised units snug and flush. Make operating parts more freely and smoothly without binding, sticking or sloppy and excessive clearance.

4.14.8 ADJUSTING AND FINISHING

.1 Adjustment: All hardware units including latching devices, locking devices, holding devices, door control devices shall be adjusted for proper operation.

Keys shall be tested in conformance with keying system. Surface finishes shall be inspected for damage. Defective units or installations shall be replaced or repaired for ARCHITECT's satisfaction. Causes for rejection include the following:

Unauthorized substitutes;

Units with missing or damaged parts;

Units or incorrect hand or function;

Incomplete installation;

Misalignment or mislocation of unit.

.2 Finishing: All exposed finished parts shall be removed and replaced before and after painting in surrounding areas.

15. WATER PROOFING

WATER PROOFING OF WET AREAS

15.1 Scope of Work

The work covered in this section of the specifications consists of furnishing all plant, labor, equipment, appliances and materials and performing all operation in connection with the supply and installation of waterproofing of basements, pools, tanks and below grade structures, complete in strict accordance with this section of the Specifications and the applicable drawings, bill of quantities and subject to the terms and conditions of the contract.

15.2 General

15.2.1 The Contractor shall be completely responsible for the supply and proper installation of the specified waterproof membrane system, or its equivalent to make the basement structure absolutely watertight. All membrane materials shall be new and shall comply with the specified material requirements. The Contractor shall produce testing certificates to verify that the membrane meets the specifications and is suitable for the end use intended.

15.2.2 The Contractor shall engage a qualified waterproofing specialist as a sub-contractor to supply, install and protect the waterproof membrane system, all in accordance with the membrane manufacturer's recommendations. The waterproofing specialists shall be approved by the Engineer and shall be selected on the basis of past track record, technical reliability, capability and willingness to supply technical assistance, and reputation for standing behind his product and work. The Contractor shall submit the name of his specialist contractor at the time of tender.

15.2.3 All basement and below-grade structures (including lift pits, water tanks, fuel tanks, etc.) shall be protected by a water proof membrane all round, of the type complying with clause 15.7

15.2.4 The Contractor shall be responsible for the implementation and maintenance of a temporary dewatering system to keep the site dry at all times for proper installation of the membrane system. Where relief holes and/or relief panels are required to be left in the basement structure to prevent hydro-static uplift during the construction stage, these shall be cast back with full water proofing treatment following completion of the superstructure and or when directed by the Engineer.

15.3 Performance Guarantee

15.3.1 The Contractor shall provide a ten (10) year guarantee for water tightness of the basement, swimming pools, tanks and or other below grade structure (including lift pits), effective from the date of completion of the whole works. The guarantee shall be submitted in the specified format and shall be subject to the approval and acceptance by the Engineer.

15.3.2 Should any leak, moist lines, points or patches occur during the guarantee period, the contractor shall immediately carry out the necessary remedial works to restore the water tightness of the structure at no cost to the Employer.

15.4 Shop Drawings

15.4.1 The Contractor shall provide the Engineer with comprehensive shop drawings showing all details and procedures for the relevant parts of the works. Reasonable time shall be allowed for checking by the Engineer in programming the production of shop drawings. Delays caused by the late submission of shop drawings or repeated amendments of drawings due to inadequate or inaccurate drawings will not be recognized as a reason for extension to the contract time.

15.4.2 The manufacturer's standard application details shall be used only as a guide for the preparation of shop drawings. The Contractor is deemed to have taken due consideration of the particular requirements of this contract based on the tender documents. Where necessary, the contractor is excepted to improve upon the manufacturer's standard details to suit the project requirements and such amendments shall be shown in shop drawings for approval by the Engineer. The Contractor shall not be entitled to extra cost and or time in this respect.

15.5 Concrete Conditioning

15.5.1 The membrane material shall be compatible with the surface of concrete. The use of curing compounds, release coatings on concrete forms or admixtures in the concrete that interfere with the adhesion of the barrier material to concrete shall not be permitted.

15.5.2 Curing compounds shall not be used on concrete surfaces unless the contractor can conduct field tests to demonstrate that complete removal of the compound can be achieved before application of the membrane. Alternatively, the contractor may perform field tests to establish the compatibility of the compound with the membrane materials and the concrete surface.

15.5.3 Release agents such as oil, wax, grease and silicone which transfer to the concrete surface during placement, and contribute to poor adhesion between membrane system and concrete, shall not be used. The use of

proprietary paint systems applied to forms and promulgated to prevent contamination of the concrete surface, or the use of polyethylene lined forms, may be considered.

- 15.5.4 Special purpose admixtures, such as water-immiscible chemicals intended to retard evaporation of water during cure, may create adhesion problems and shall not be used.

15.6 Concrete Surface Preparation

- 15.6.1 Surface defects, including the holes, unless otherwise specified in the contract documents, shall be repaired immediately after form removal. All honeycombed and defective concrete areas shall be removed down to sound concrete which shall then be cleaned. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut. No feather edges shall be permitted.
- 15.6.2 Unless specially recommended by the membrane material manufacturer normal mix Portland Cement-based patching materials shall not be used for the repair of small surface voids and rutted cracks on account of their relatively poor adhesion to cured concrete. Such repair shall be effected with suitable resin-based materials composed of the same resin found in the protective membrane material mixed with inert fillers, but the specific recommendation of the membrane system manufacturer shall be obtained before using such materials for patching. Coarse aggregate shall be omitted.
- 15.6.3 Large surface voids and rutted cracks shall be dry packed with graded aggregate and pressure grouted with suitable non-shrink cementation mortar.
- 15.6.4 The quantity of mixing water shall be limited to that necessary for handling and placing. The patching material shall be thoroughly mixed to the extent that it is the stiffest consistency that will permit placing.
- 15.6.5 The area to be patched and a band at least 150mm wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. After surface water has evaporated from the area to be patched, an approved bonding agent shall be well brushed into the prepared surface. The premixed patching mortar shall be thoroughly consolidated into place. Struck off so as to leave the patch slightly higher than the surrounding surface and left undisturbed for at least 1 hour to allow for some initial shrinkage before being finally finished. The patched area shall be kept damp for 7 days.
- 15.6.6 Proprietary compounds may be used in lieu of, or in addition to, the foregoing patching procedures. Such compounds must be used strictly in accordance with the manufacturer's recommendations. Specific

approval from the membrane manufacturer shall be obtained before proprietary compounds are used for patching. These materials shall be compatible with the membrane system and the concrete and not interfere with good adhesion between the two.

15.6.7 Fins, protrusions or similar irregularities projecting from the concrete surface shall be removed back to the surface by chipping, bush hammering, needle gunning, or wire brushing. Care shall be exercised to obtain a reasonably planar surface for application of the membrane system. Sharp offsets in the surface, such as those caused by formwork misalignment shall be mechanically abraded to provide gradual and smooth transitions between the offset surfaces.

15.6.8 The Contractor shall employ a suitable method of repair to stop any seepage or flow of water into or through the concrete structure prior to application of the membrane system. The method of repair shall depend on the type of defects present in the concrete and the source of water.

15.6.9 Generally, surfaces shall be dry and must be newly exposed concrete, free of chemical contaminants and loose, weak or unsound materials.

15.7 Material

SANIFLEX water proofing by AQUAFIN bldg product system
Liquid applied, fast setting, elastomeric water proof membrane
Description:

SANIFLEX is a liquid applied, ready to use, synthetic rubber based polymer dispersion which dries to form a seamless elastomeric waterproof membrane. The waterproof membrane provides a breathable yet water proof elastomeric barrier with crack bridging properties.

Uses:

SANIFLEX is used to waterproof wet rooms such as shower areas, bathrooms, kitchens and sanitary areas in public and private buildings. SANIFLEX is suitable for fast track job requirements and overcomes the complications associated with intricate water proofing details. SANIFLEX is, however, not suitable for continuous water immersed conditions or as a final exposed waterproof finish.

Advantages:

Easy to apply single component.
Single application possible, reducing working steps.
Seamless waterproof membrane system.
Fast curing allows filing on same day.
Excellent crack bridging properties.
Breath ability allows release of trapped moisture.

Specification Compliance:

SANIFLEX is approved as the waterproof component of German ZDB Code of Practice for the application of indoor and outdoor waterproofing filing systems.

Notes:

Excess material and spillage should be immediately cleaned and disposed if in accordance with local environmental regulations.

Properties:

Density	1.5 K.g/ Lit at 20°C	
	At 20°C	At 40°C
Tensile strength:	2.15M/mm ²	2.05 N/mm ²
Elongation:	114%	86%
Pot life:	60 minutes	45 minutes
Tack Free:	4 Hours	3 Hours
Trafficable:	6 Hours	4 Hours
Recoatable (open to filing)	6 Hours	4 Hours
Full cure (hours):	48 Hours	36 Hours
Crack Bridging:	>0.75mm at 0.8mm dft	
Water vapour transmission (Sd):	7.9 m	
Application temperature:	Min: +5°C, Max: +42°C	
Service temperature:	Min -10, Max: +45°C	

Surface preparation:

All surfaces to receive SANIFLEX should be clean, sound, dry and free from grease, oils, curing membranes, laitance and any loose particles to ensure good adhesion, in accordance with the ZDB Code of Practice recommendations. Surfaces should be smooth and fine textured with undulations leveled off where possible. Concrete and cementations substrates should be at least 5 days old.

Priming:

Where necessary to seal off dust and cohesiveness to improve the substrate, use ASO-UNIGRUND-GE. It is recommended that SANIFLEX be applied at a rate of 1.2kg/m² once the primer is dry.

Application:

Prior to the application of SANIFLEX, it is recommended that all construction joints, up stands (wall/floor joints) pipe inlets and outlets are sealed with ASO-JOINT-TAPE 2000 SANIFLEX is used to fix including overlaps, internal/external corner pieces and sealing of pipe inlets and outlets, Apply SANIFLEX by brush, roller or notched trowel.

For a single application, use a 3mm notched trowel to evenly spread SANIFLEX followed by smoothing with a roller.

For brush a roller applications, two coats are recommended. The first coat should dry (3) hours at 40°C before the second coat is applied.

Once the final SANIFLEX layer/ coat is dry filing can commence using a polymer modified the adhesive such as UNIFIX, MONOFLEX, or UNIFIX -2K.

Consumption:

SANIFLEX: 1.2 kg/m² (at 0.8mm dft)
ASO-UNIGRUND-GE: 0.2 kg/m²

Important Notes:

Practical coverage rates may differ from the above stated figures based on texture and porosity of substrate. Wastage during application should also be considered.

Packaging:

SANIFLEX: 20 and 180 kg packs
ASO-UNIGRUND: 10, 25 & 180 kg packs

Storage and shelf life:

12 months in original, unopened palletized containers, stored in well ventilated, dry conditions at temperatures between 5°C and 30°C

Health & safety:

SANIFLEX is none hazardous. When in doubt refer to relevant Material Safety Data Sheet. Please refer to local environmental laws for modes of disposal.

Cleaning:

Unhardened SANIFLEX can be removed from tools and equipment with water. Once cured, SANIFLEX can only be removed mechanically.

ASO joint tape 2000 for detail works

All details such as joints, pipe penetrations and drainage must first be prepared before overall waterproofing of the wet area, as detailed hereafter:

Construction Joints:

Using SANIFLEX as adhesive to fix a 12cm wide ASO-JOINT-TAPE 2000, flexible (+60% elongation) joint sealing tape or equivalent. ASO-JOINT-TAPE 2000 must be placed centrally aligned across the joints center line.

SANIFLEX must be applied at a thickness of 1-1.5mm by lambs wool roller or brush, extending 100-120mm either side of the joint line.

Use a spatula or trowel to press down and flatten ASO-JOINT-TAPE 2000 into the freshly applied SANIFLEX.

Allow excess SANIFLEX to extrude out of the perforation on both sides of the sealing tape.

Use T and X junction pieces where necessary

Use SANIFLEX as an adhesive for overlaps of ASO-JOINT-TAPE 2000.

Minimum overlap length must be 50mm

Once SANIFLEX is dry proceed with the overall waterproofing.

Expansion Joints;

Using SANIFLEX as adhesive to fix a 12cm wide ASO-JOINT-TAPE 2000 elastomeric (+600% elongation) joint sealing tape or equivalent.

ASO-JOINT-TAPE 2000 must be placed centrally aligned across the joint's center line.

SANIFLEX must be applied at a thickness of 1 – 1.5mm by lamb wool roller or brush, extending 100-120mm either side of the joint line.

Using a spatula or trowel press down and flatten ASO-JOINT-TAPE 2000 into the freshly applied.

SANIFLEX, Allow excess SANIFLEX to extrude out of the perforations on both sides of the sealing tape.

Use T & X junction pieces where necessary.

Use SANIFLEX as an adhesive for overlaps of ASO-JOINT-TAPE 2000.

Minimum overlap length must be 50mm.

Once SANIFLEX is dry proceed with the overall waterproofing.

Upstands (Vertical/ Horizontal)

Using SANIFLEX as adhesive to fix a 12cm wide ASO-JOINT-TAPE 2000, flexible (+60% elongation) joint sealing tape or equivalent on upstands.

ASO-JOINT-TAPE 2000 must be placed centrally aligned across the joints center line.

SANIFLEX must be applied at a thickness of 1-1.5mm by lambwool roller or brush, extending 100-120mm either side of the joints center line.

Using a spatula or trowel press down and flatten ASO-JOINT-TAPE 2000 into the freshly applied SANIFLEX.

Allow excess SANIFLEX to extrude out of the perforations on both side of the sealing tape.

Use T and X junction pieces where necessary.

Use SANIFLEX as an adhesive for overlaps of ASO-JOINT-TAPE 2000.

Minimum overlap length must be 50mm

Once SANIFLEX is dry proceed with the overall waterproofing.

Alternatively form a 50mm cove using a ready to use cementations coving mortar such as ASOCRET-RN

Pipe/ drain penetrations:

PVC:

Sand down and degrease PVC pipes and drains with acetone or iso-propanal. Wipe clean surface with dry cloth, brush apply SANIFLEX to 30mm of pipe from wall.

Prepare ASO-JOINT. Sleeve wall & floor pieces or equivalent. Cut open ASO-JOINT-Sleeve dimensions.

Push ASO-JOINTS-Sleeve into position and press down with spatula to flatten out, ensure edges of ASO-JOINTS-Sleeve fleece are firmly adhered to wall/ floor.

Steel:

All rust and scale should be removed and a surface cleanliness achieved in accordance with SA 2 ½ requirements. Wipe clean immediately after shot/ grit blasting with a dry cloth and apply where necessary one coat of ASODUR-GBM, epoxy primer, then broadcast with clean quartz sand to form a rough surface. Once dry commence immediately with SANIFLEX application.

Prepare ASO-JOINT-Sleeve wall and floor pieces or equivalent. Cut open ASO-JOINTS-Sleeve Floor to shape ensuring diameter size is 5mm smaller than train.

Brush or roller apply SANIFLEX to wall, ensuring minimum 50mm beyond ASO-JOINTS-Sleeve dimensions.

Push ASO-JOINTS-Sleeve fleece are firmly adhered to wall/ floor.

Product Application:

General:

SANIFLEX is a waterbased single component, waterproof membrane, SANIFLEX is typically applied in two coats by brush or roller. A single application by brush or roller is also possible.

When using trowel or airless spray, single or double applications are possible. It is important that the following rules be adhered to.

Concrete and screeds should be at least 5 days old

If primed, ensure the surface is dry prior to application of SANIFLEX

Joints, cracks, corners and upstands (vertical/ horizontal joints) must be sealed using ASO-JOINTS-TAPE 2000. Alternatively form a 50mm cave using either pre-bagged ASOCRETE-RN or site prepared re-profiling mortar with ASOPLAST-MZ a styrene copolymer bonding agent (refer to data sheets and method statements)

For brush roller applications please ensure the maximum thickness per p=layer=0.4m

Minimum waiting time between coats 4 hours at 35° C (or 6 hours at 20°C) in well ventilated areas

In closed areas, longer waiting periods may be necessary. Always ensure a dry surface is attained before proceeding with subsequent coat of riling.

In case of brush or roller application, each coat should be applied perpendicular to previous coat direction.

Improved viscosity:

For improved viscosity, SANIFLEX may be diluted with clean cool water at the following rates provided through mixing using suitable mixing paddle:

Brush, roller or trowel application: 10% (2 liters/ 20kg pail)

Airless spray application: 8% (1.8 liters/ 20kg pail)

The material should be left for 5 minutes before application.

Brush or roller application:

The application of SANIFLEX is done with a long bristle, medium stiff brush or lambswool roller as a double coat application.

Trowel:

Use a 3mm serrated trowel edge for single coat applications. Start first with wall then floor, immediately followed by a roller to even surface finish.

Airless Spray:

SCHOMBURG recommends the use of appropriate airless spray equipment for large application areas.

Please refer to SCHOMBURG for list of approved spray equipment.

Due to the effect of temperature on viscosity, the operator will determine the best pressure and nozzle size.

Generally a pressure of 75 bars and a nozzle size of 1.5mm is suitable starting point.

Use a lambswool roller or straight edge trowel immediately after spraying to smoothen the applied surface.

Cleaning:

Warm water is to be used for removal of unhardened material. Hardened material can be removed mechanically or by using on industrial cleanser such as Rozalex.

In case of contact with eyes, rinse with plenty of water and seek medical attention, In case of doubt please refer to Material Safety Data Sheet.

Curing:

Re-coating and filing:

SANIFLEX is recoat able after 4 hours at 40° C (6 hours at 20° C) and relative humidity of 65%. In case of higher RH levels, waiting times will be increased.

The SANIFLEX surface must be touch dry.

Water testing:

SANIFLEX cures in 36 hours at 40° C (48 hours at 20° C) and relative of 65% In case of higher RH levels, waiting times will be increased.

SUKKUR IBA UNIVERSITY
Construction of Academic Block-II at IBA CC Jacobabad.
Total Cost Abstract (Summary)

S.No	Description	Amount (Rs)
1	Piling Work	
2	Civil Work	
3	Electrical Work	
4	Plumbing Work	
	Total Amount (Rs)	

In Words _____

Name of the Firm / Company

Name of the Owner / Proprietor

Seal of the Company

Signature

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
1	EARTHWORKS				
1.1	Excavation Excavation for foundation in any type of soil i/c dewatering if any as per specifications and relevant drawings and shifting of excavated earth Lead up to 1.5 Km or as directed by the Engineer Incharge .	10,000	Cft		
1.2	Dewatering Providing and arranging dewatering by heavy pumping machine as per site requirement.	1	Job		
1.3	Backfilling				
1.3.1	Back filling With imported earth (Sweet)/River sand with compaction upto 95% or as directed by the Engineer Incharge.	24,950	Cft		
1.4	Stone Soling/ Stone Ballast				
1.4.1	Under Pile cap as instructed by Engineer incharge (Size of Stone soling 6"-9"/Stone ballast 2"-3" size filled with filler material)	1,400	Cft		
1.4.2	Under Floor 6" thick as per drawing /Instructions of Engineer incharge (Size 2"-3")	500	Cft		
1.4.3	Polyethylene/Plastic Sheet under Pile Cap (Polyethyelene 0.2 mm)	2,800	Sft		
TOTAL COST OF EARTHWORKS					

IBA COMMUNITY COLLEGE, JACOBABAD				Civil Works (BOQ)	
S#	Description	Qty	Unit	Rate	Amount
2	PLAIN & REINFORCED CONCRETE Providing and laying cement concrete, plain or reinforced of specified ratio, as on drawing, on compacted and level surface where needed, in any and all locations, complete in all respects with curing, as per specifications and relevant drawings				
2.1	Plain Concrete (upto plinth level) Using S.R. cement and steel shuttering/new marine ply sheets Ratio as per drawing				
2.1.1	Under Pile Cap PCC 1:4:8	2,000	Cft		
2.1.2	Under Plinth Beam PCC 1:4:8	1,350	Cft		
2.1.3	Under Floor PCC 1:4:8 (4" Thick) GF	1,600	Cft		
2.1.4	Under Floor PCC 1:3:6 (3" thick) GF & FF	3,200	Cft		
2.1.5	Cast in situ 1:3:6 as per drawings including embaded rebars 2#3 in column at every 1 ft in walls inside or outside	400	Cft		
2.2	Reinforced Concrete (upto plinth level) Using S.R. cement and steel shuttering, lacing, and bracing as per ACI 347R-14 and steel reinforcement placement as per ACI 318 Standards. Ratio for slab & beam 3000 psi Ratio for Column 4000 psi Ratio for Foundation and wall 3000 psi				
2.2.1	Pile Cap	6,500	Cft		
2.2.2	Column	1,100	Cft		
2.2.3	Plinth Beam	2,375	Cft		
2.2.4	RCC Wall (as per drawing)	750	Cft		

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
2.3	Reinforcement Concrete				
	Using O.P. cement and steel shuttering/ marine ply lacing, and bracing as per ACI 347R-14 and steel reinforcement placement as per ACI 318 Standards. for beams and slabs. Ratio for Foundation,slab & beam 3000 psi Ratio for Column 4000 psi				
2.3.1	Ground Floor				
2.3.1.1	Column	2,500	Cft		
2.3.1.2	Beam	3,275	Cft		
2.3.1.3	Slab (As per Structural drawings)	6,350	Cft		
2.3.1.4	RCC Wall (as per drawing)	200	Cft		
2.3.2	Stiar steps	395	Cft		
2.3.2	First Floor				
2.3.2.1	Column	2,500	Cft		
2.3.2.2	Beam	5,300	Cft		
2.3.2.3	Slab (As per Structural drawings)	7,000	Cft		
2.3.2.4	RCC Wall (as per drawing)	180	Cft		
2.3.2.5	Stiar steps	90	Cft		
2.3.4	Roof				
2.3.4.1	Column	20	Cft		
2.3.4.2	Beam	150	Cft		
2.3.4.3	Slab (As per Structural drawings)	100	Cft		
TOTAL COST OF PLAIN AND REINFORCED CONCRETE					

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
3	STEEL REINFORCEMENT Providing and preparing in position steel reinforcement bars including all allied work necessary, complete in all respects				
3.1	Deformed Steel bars grade 60 from Amreli or Razzak	195	Ton		
TOTAL COST OF STEEL REINFORCEMENT					
4	BRICK MASONRY Providing and laying brick masonry from Rahimyar Khan /Gomal /SPL (Special) or approved equiv. Ratio 1:4, drilled 2#3 rod at every 2 ft with every connection to RCC members complete in all respect				
4.1	Ground Floor				
4.1.1	4-½" thick	2,800	Sft		
4.1.2	9" thick	10,350	Sft		
4.2	First Floor				
4.2.1	4-½" thick	2,800	Sft		
4.2.2	9" thick	11,900	Sft		
4.3	Roof & Parapet				
4.3.1	9" thick	2,400	Sft		
TOTAL COST OF BRICK MASONRY					

IBA COMMUNITY COLLEGE, JACOBABAD				Civil Works (BOQ)	
S#	Description	Qty	Unit	Rate	Amount
5	FACING BRICK MASONRY Providing and laying facing brick masonry from Lahore 9"x4½"x3" thick with grooved joints, Ratio 1:2 bed mortars & Pigment color(As per instruction of Engineer Incharg or as shown on drawings including all related works i.e Steel hooks imbeded in ordinary masonry wall and angel iron 3"x3"x3 soot with nail/screw/anchor bolt at beam or roof level as directed by Engineer				
5.1	External/ Internal				
5.1.1	Ground Floor	7,400	Sft		
5.1.2	First Floor	8,000	Sft		
5.1.3	Roof Parapet	2,500	Sft		
5.2	Providing and laying Strip facing brick masonry from Lahore 9"x4½"x3" thick with grooved joints, Ratio 1:2 bed mortars & Pigment color(As per instruction of Engineer Incharg or as shown on drawings including all related works i.e Steel hooks imbeded in ordinary masonry wall and angel iron 2"x2"x2soot with nail/screw/anchor bolt at beam or roof level as directed by Engineer				
5.2.1	Ground Floor	400	Sft		
5.2.2	First Floor	400	Sft		
TOTAL COST OF FACING BRICK MASONRY					

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
6	PLASTER Providing and laying plaster,3/4" thick as per ACI 524R-16 Specifications , in two layers, with ratio 1:4, complete in all respects.				
6.1	Ground Floor Ceiling	9,700	Sft		
6.2	Ground Floor Wall	16,100	Sft		
6.3	First Floor Ceiling	9,200	Sft		
6.4	First Floor Wall	21,600	Sft		
6.5	Roof Ceiling	1,200	Sft		
6.6	Roof Wall	700	Sft		
6.7	Parapet Wall	1,900	Sft		
TOTAL COST OF PLASTER					
7	FLOORING AND SPECIAL FINISHES				
7.1	Tile Floor Providing & laying of porcelain (Master or equivalent tile 600x600) tile with all base beds, mortar Ratio 1:3 and necessary allied work, complete in all respect as per the instructions of the Engineer				
7.1.1	Ground Floor	9,200	Sft		
7.1.2	First Floor	9,000	Sft		
7.2	Skirting (As per drawings)				
7.2.1	Ground Floor	1,700	Rft		
7.2.2	First Floor	1,800	Rft		

IBA COMMUNITY COLLEGE, JACOBABAD				Civil Works (BOQ)	
S#	Description	Qty	Unit	Rate	Amount
7.3	Tile in Toilet Area				
	Providing & laying of Ceramic/porcelain (Master/ equivalent tile 300x600) tile with all base beds, mortar Ratio 1:3 and necessary allied work, complete in all respect as per the instructions of the Engineer Incharge				
7.3.1	Ground Floor				
7.3.1.1	Floor porcelain 300mm x 600mm	800	Sft		
7.3.1.2	Wall ceramic 300mm x 600mm	3,450	Sft		
7.3.2	First Floor				
7.3.2.1	Floor porcelain 300mm x 600mm	600	Sft		
7.3.2.2	Wall ceramic 300mm x 600mm	2,550	Sft		
7.4	Granite Stair Steps				
	Providing & Fixing Chunki Pink or as pproved steps with all base beds, mortar Ratio 1:2 and necessary allied work, complete in all respect as per the instructions of the Engineer Incharge				
7.4.1	Tread 4'-0" ft	12	Nos.		
7.4.2	Riser 4'-0" ft	14	Nos.		
7.4.3	Tread 4'-6" ft	44	Nos.		
7.4.4	Riser 4'-6" ft	48	Nos.		
7.4.5	Tread 6'-3" ft	33	Nos.		
7.4.6	Riser 6'-0" ft	38	Nos.		
7.4.7	Tread 7'-6" wide	12	Nos.		
7.4.8	Riser 7'-6" wide	15	Nos.		
7.4.9	Tread 19'-6" wide	6	Nos.		
7.4.10	Riser 19'-6" wide	7	Nos.		
7.4.11	Landing / entrance floor	767	Sft		
7.4.12	Counter Tops	185	Sft		
TOTAL COST OF FLOORING AND SPECIAL FINISHES					

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
8	D.P.C. Providing and laying DPC with Elastomat it self F1700 Torch applied complete in all respect as shown on drawing/As per instructions of Engineer Incharge				
8.1	D.P.C.	1,000	Sft		
TOTAL COST OF D.P.C.					
9	CONVENTIONAL ROOFING/ROOF TREATMENT Providing & Laying water proofing membrane sheet (Hygrip) 4 mm thick i/c cost of surface preparation, bituminous prime coat complete in all respects, along with 3" thick average pcc screed with proper slope (ratio 1:3:6) and 2" thick pcc 1:2:4 roof topping making into panels (size 4'x4') with 1/2" groove filled with bitumen (Grade 10/20) , as per drawing or as directed by Engineer incharge.				
		12,200	Sft		
TOTAL COST OF CONVENTIONAL ROOFING					
10	JOINERY				
10.1	WOOD WORK Providing and fixing 1½" thick solid core commercial ply veneer flush door shutters with 1 ½" x ⅝" lipping, including 16 SWG GI Frame painted, as per specification, drawings and instructions of the Architect/Engineer incharge, i/c Hard ware (l/c Hinges, Door Closer, push plates and Handle lock of Newise or as approved quality and brand)				
10.1.1	D-1	4'-0"X8'-0"	12	Nos	
10.1.2	D-2	3'-3"X8'-0"	18	Nos	
10.1.3	D-3	3'-3"X8'-0"	2	Nos	
10.1.4	D-4	2'-6"X8'-0"	8	Nos	
10.1.5	D-5	2'-6"X7'-0"	12	Nos	

IBA COMMUNITY COLLEGE, JACOBABAD				Civil Works (BOQ)	
S#	Description	Qty	Unit	Rate	Amount
10.2	ALUMINIUM WINDOWS				
	Providing and fixing Aluminium joinery of 2"x4" section (Pakistan Cable), anodized with minimum wall thickness not less than 2 mm with netted shutter, SS 304 friction bar hinges 16" & 5mm glazing (Handle & catcher of kinlong or approved brand and quality as per specification, drawings and instructions of the Architect/Engineer incharge.				
10.2.1	W-1	3'-0"X8'-0"	2,160	Sft	
10.2.2	W-2	2'-6"X8'-0"	200	Sft	
10.2.3	W-3	8'-0"X8'-0"	64	Sft	
TOTAL COST OF JOINERY WORK					
11	HANDRAIL				
11.1	Type 1(Main stair) Providing and fixing MS Pipe (14 Guage) Hand rail as per drawing.				
			95	Rft	
11.2	Type 2(Terrace) Providing and fixing MS Pipe (14 Guage) Hand rail as per drawing.				
			150	Rft	
11.3	Type 3 (Service Stair) Providing and fixing MS Pipe (14 Guage) Hand rail as per drawing.				
			130	Rft	
TOTAL COST OF HANDRAIL					

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
12	PAINTING				
12.1	Providing and Painting 03 coats of Matt Enamel mix with same brand of tarpaulin in described ratio complete in all respects (Brand ICI Dulux or Equivalent) as directed by Engineer or incharge				
12.1.1	Ground Floor Ceiling	9,700	Sft		
12.1.2	Ground Floor Wall	16,100	Sft		
12.1.3	First Floor Ceiling	9,200	Sft		
12.1.4	First Floor Wall	21,600	Sft		
12.1.5	Roof Floor Ceiling	1,200	Sft		
12.1.6	Roof Floor Wall	700	Sft		
12.2	Weathershield				
	Providing and applying 3 coats of ICI DULUX or Equivalent mix with water /tarpetine oil, in described ratio Weathershield paint to exterior surface as specified and directed by engineer or incharge.				
12.2.1	Exterior surface/Parapet Wall	2,000	Sft		
TOTAL COST OF PAINTING					
13	TERMITE CONTROL				
	Providing and applying Anti-termite dosing to all surface in contact with earth from Agenda (EC-25) as per specification or as directed by Engineer.	1	Job		
TOTAL COST OF TERMITE CONTROL					

IBA COMMUNITY COLLEGE, JACOBABAD				Civil Works (BOQ)	
S#	Description	Qty	Unit	Rate	Amount
14	MISCELLANEOUS				
14.1	Plinth Protection Providing and laying of 6" thick 1:4:8 & 3" thick 1:2:4 CC topping divided into panels with Glass/Marble strips, brick masonry 9" thick (height as per site or decided by the engineer, i-e min 3 ft below existing natural ground) including 4" inch 1:4:8 below masonry with 3" offsets each side as per drawings /Instructions of Architect/ Incharge Engineer	2,100	Sft		
14.2	Fairface Precast Concrete Copping Providing & Fixing Pre cast Concrete coping (ratio 1:2:4) with cement mortar (ratio 1:4) size as per drawing, , complete in all respects, as directed by Engineer incharge.	550	Rft		
14.3	Fairface Precast Concrete Sill Providing & Fixing Pre cast Concrete sill (ratio 1:2:4) with cement mortar (ratio 1:4) size as per drawing, , complete in all respects, as directed by Engineer incharge.				
14.3.1	2'-6" wide	8	Nos.		
14.3.2	3'-0" wide	91	Nos.		
14.3.3	8'-0" wide	1	Nos.		
14.3.4	20'-6" wide	6	Nos.		
14.4	Wall Insulation Providing and laying 1½ inches thick polystyrene (Jambolon) insulation complete in all respect as per the instruction of the Architect/Incharge Engineer				
14.4.1	Surrounding of OHW Tank	500	Sft		

IBA COMMUNITY COLLEGE, JACOBABAD					Civil Works (BOQ)
S#	Description	Qty	Unit	Rate	Amount
14.5	Providing and fixing Toilet Mirror belgium/Saudi or as approved min 5mm thick , as per drawing	150	Sft		
14.6	Providing and fixing- Grey CC Jali as per drawing and instructions of Engineer incharge	350	Sft		
14.7	Under Ground Tank as per drawing/site/directed by Engineer	8000	Gln		
14.8	Septic Tank as per drawing/site/directed by Engineer	4000	Gln		
14.9	Overhead Tank as per drawing/site/ditected by Engineer	14700	Gln		
14.10	Providing and laying of Envicrete pavers 60mm thick (City/cobble) i/c 1-2 inch filler material (khaka) as per instructions of Architect/ Engineer incharge	1000	Sft		
14.11	Providing and laying of Envicrete tough tile for Ramp (size 12"x12") i/c mortar ratio 1:3, as per instructions of Engineer incharge	350	Sft		
14.12	P/L 16 SWG Aluminum Corner bidding at every free corner or as directed by Engineer	256	Rft		
14.13	P/L Aluminum strip ceiling 1200x300 mm by CMC i/c all suspension system as per drawing , complete in all respect or as directed by Engineer.	1070	Sft		
TOTAL COST OF MISCELLANEOUS					

IBA COMMUNITY COLLEGE, JACOBABAD				Civil Works (BOQ)	
S#	Description	Qty	Unit	Rate	Amount
	SUMMARY				
1	TOTAL COST OF EARTHWORKS				
2	TOTAL COST OF PLAIN AND REINFORCED CONCRETE				
3	TOTAL COST OF STEEL REINFORCEMENT				
4	TOTAL COST OF BRICK MASONRY				
5	TOTAL COST OF FACING BRICK MASONRY				
6	TOTAL COST OF PLASTER				
7	TOTAL COST OF FLOORING AND SPECIAL FINISHES				
8	TOTAL COST OF D.P.C.				
9	TOTAL COST OF CONVENTIONAL ROOFING				
10	TOTAL COST OF JOINERY WORK				
11	TOTAL COST OF HANDRAIL				
12	TOTAL COST OF PAINTING				
13	TOTAL COST OF TERMITE CONTROL				
14	TOTAL COST OF MISCELLANEOUS				
	TOTAL COST OF CIVIL WORK				

**SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE JACOBABAD**

**Habib Fida Ali, Architect
Piling Works**

S. NO.	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Boring for 30" Dia Piles in Medium Dense Silty Sand.(Depth of Piles as per Drawing)	Rft	4,200		
2	Concrete having minimum cylinder strength $f_c'=4000\text{psi}$ at 28 Day using SRC (Sulphate Resistant Cement) water cement ratio not to Exceed 0.45 with slump 150mm to 200mm.	Cft	20,600		
3	Providing Cutting Bending and Fixing Deformed Bars Conforming to ASTM A-615 Grade 60 cold drawn/hot rolled having yield strength 414 N/mm ² (60,000psi) tying with 18SWG binding wire including chairs and spacers as per drawing and instruction by the Engineer	Ton	45		
4	Static Pile Load as per ASTM D1143M-07 Test Load On Index Pile 260 MT.	Nos.	1		
5	Low strain impact Integrity Test of each working Pile as per ASTM D-5882.	Nos.	85		

**SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE JACOBABAD**

**Habib Fida Ali, Architect
Piling Works**

S. NO.	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
6	Cutting of Piles Heads (Over flawn concrete) of Piles in sequence carefully with the progress of excavation up to the level shown on drawing including straightening and bending reinforcement as per drawing specification and instruction by the Engineer including dispose off broken concrete debris upto 1.5 Kms/ as per Engineer's Instruction	Cft	1,300		
7	Cutting of Piles Sides to Anchor Pile Cap Reinforcement Including dispose off broken concrete Debris upto 1.5 Kms/ as per Engineer's Instruction.	Cft	450		

GRAND TOTAL

**SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE (JACOBABAD)**

**PLUMBING SYSTEM
BILL OF QUANTITIES**

S.NO.	DESCRIPTION	UNIT	QTY	RATE	TOTAL AMOUNT Rs.
SECTION - 01, PROVIDING & FIXING OF PLUMBING FIXTURES					
	Providing & fixing of plumbing fixtures & faucets complete in all respects including all accessories, support, hangers, etc. ready to use as per specifications, drawings and instructions of Consultant.				
1.1	European / Asian style coupled W.C. with seat cover, flush tank C.P. (chrome plated) tee stop cock, C.P. connector, thimble, etc.				
	Type - Asian WC	Nos.	12		
i.	Type - European WC	Nos.	12		
1.2	Urinal with , flush tank C.P. (chrome plated) tee stop cock, C.P. connector, thimble, etc.	Nos.	2		
1.3	Wash basin including C.P., P- trap, stop cocks, hot and cold mixer, waste, etc.				
i.	Type - Pedestal W.B	Nos.	2		
ii.	Type - Vanity	Nos.	22		
1.4	Toilet Hand Shower with flexible chain & telephone type shower Including tee stop cock etc. complete in all respect.				
i.	Type - MS	Nos	24		
1.5	Stainless steel kitchen imported single bowl sink (17"X23") including stop cocks, P-trap, hot cold mixer, waste pipe etc complete in all respects.				
i.	single sink bowl.	Nos.	1		
1.6	Toilet accessories complete set, (Imported make)				
i.	Soap Dispenser	Nos.	15		
ii.	Towel Rod	Nos.	3		
iii.	Paper holder	Nos.	24		
iv.	Coat hooks	Nos.	24		
v.	Hand Dryer	Nos.	8		
vi.	Single Bib Cock	Nos.	6		
vii.	Double Bib Cock	Nos.	24		
viii.	Hose Bib	Nos.	7		
ix.	Grab Bar (S.S 304)	Set	2		
		Sub Total:			

**SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE (JACOBABAD)**

**PLUMBING SYSTEM
BILL OF QUANTITIES**

S.NO.	DESCRIPTION	UNIT	QTY	RATE	TOTAL AMOUNT Rs.
	SECTION-02 WATER SUPPLY SYSTEM				
	Providing & fixing , testing and commissioning of complete pipe work for cold and hot water system including all accessories required to complete systems ready to operate as per specificatoin, drawings & instrucion of Consultant.				
2.1	Polypropylene Random PP-R pipes PN- 20 and fittings with fusion jointing alongwth all types of unions, tees, bends, sockets, clamps, hangers, supports, sleeves, masking plates, chiseling, making holes making good, excavation, bedding backfilling as required complete in all respect. (Dadex)				
i.	Dia. 1/2" (OD 20 mm)	Rft.	25		
ii.	Dia. 3/4" (OD 25 mm)	Rft.	520		
iii.	Dia. 1" (OD 32 mm)	Rft.	374		
vi.	Dia. 1-1/4" (OD 40 mm)	Rft.	95		
v.	Dia. 2" (OD 63 mm)	Rft.	35		
vi.	Dia. 2-1/2" (OD 75 mm)	Rft.	70		
2.2	Providing & fixing jointing testing PPR Pipe lines for water supply as per BS 1387 medium quality III. Including specials sockets tee, elbow, bend, reducer plug and union etc) supported on walls or suspended from roof slab, including protective coating as per drawing and specifications including color coding complete in all respects.				
i.	Dia. 1" (OD 32 mm)	Rft.	25		
ii.	Dia. 1-1/4" (OD 40mm)	Rft.	65		
iii.	Dia. 2" (OD 63 mm)	Rft.	355		
2.3	Brass body gate valves / ball valves with unions				
i.	Size 1"	Nos.	1		
ii.	Size 1-1/4"	Nos.	1		
iii.	Size 1-1/2"	Nos.	5		
iv.	Size 2-1/2"	Nos.	5		
2.4	Brass body foot valve				
i.	Size 2-1/2"	Nos.	1		
2.5	Brass body check valve				
i.	Size 2-1/2"	Nos.	1		
2.6	C.I. Cover with frame for under ground tank & over head tank.				

**SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE (JACOBABAD)**

**PLUMBING SYSTEM
BILL OF QUANTITIES**

S.NO.	DESCRIPTION	UNIT	QTY	RATE	TOTAL AMOUNT Rs.
i.	24"x24" (weight 50 kg.)	Nos.	6		
2.7	C.I. Goose Neck for under ground tank & over head tank.				
i.	4" Dia	Nos.	3		
2.8	Providing & fixing Water supply pumps with electric motor complete in all respects including C.C foundation, inlet/outlet connections, electrical connection with all fixing accessories, complete in all respects.				
i.	Type WP-01 @65gpm @ 50ft head (2 HP)	Set	1		
Sub Total:					
SECTION-03 SOIL, WASTE VENT AND RAIN WATER DRAINAGE SYSTEM					
	Providing & fixing, testing and commissioning of equipment, pipe work required to complete the soil, waste, vent and rain water systems in all respects with accessories ready to operate as per specifications, drawings and instructions of Consultant. (Dadex)				
3.1	UPVC pipes of approved make (Dadex Nikasi / Equivalent) along with specials, fittings, bends, wye, tees, sockets, sleeves, masking plates, traps, vent cowls, chiseling, making hole, excavation, backfilling making good where as required jointing with rubber ring seal.				
i.	Dia 1-1/2"	Rft.	150		
ii.	Dia. 2"	Rft.	10		
iii.	Dia. 3"	Rft.	572		
iv.	Dia. 4"	Rft.	324		
3.2	Floor Drain including SS grating Floor gully, inlet outlet connection complete in all respects.				
i.	FD	Nos.	40		
3.3	uPVC cowl for vent pipe of the following dia. including all accessories complete.				
i.	3" size.	Nos.	3		
ii.	4" size.	Nos.	2		
3.4	Cleanout for soil, waste pipes of approved make.				
i.	3" dia. FCO With SS floor cover plate	Nos.	6		
ii.	4" dia. FCO With SS floor cover plate	Nos.	7		
3.5	Rain Water Grating				
i.	3" dia side wall rainwater outlet	Nos.	8		

**SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE (JACOBABAD)**

**PLUMBING SYSTEM
BILL OF QUANTITIES**

S.NO.	DESCRIPTION	UNIT	QTY	RATE	TOTAL AMOUNT Rs.
3.6	Supply & installation 6" wide drain channels with PVC Grating complete with all respects and as approved by the Consultant				
i.	Size 6" wide	Rft.	40		
3.7	Submersible pump for waste water drainage including float switch, water proof cable, check valve with union, lifting chain, complete in all respects				
i.	SP-01 @40gpm @ 20ft head	Set	1		
		Sub Total:			
SECTION-04 EXTERNAL SEWER SYSTEM					
	Providing & fixing, testing and commissioning of equipment, pipe work required to complete the sewerage disposal services in all respects with accessories ready to operate as per specifications, drawings and instructions of Consultant.				
4.1	UPVC pipes (Dadex Nikasi / Equivalent) for Sewer drainage with solvent joint, including excavation in any type of soil, dewatering if required bedding, back filling with selected material, removing of extra materials.				
i.	Dia. 4"	Rft.	50		
ii.	Dia. 6"	Rft.	330		
iii.	Dia. 8"	Rft.	110		
4.2	Construction of manholes with material including, excavation, base top RCC slab CI cover with frame, GI steps, CC benching water proof internal plaster inlet/out connections , complete in all respects				
i.	Size 24"x24" (wt 35 Kgs)	Nos.	10		
4.3	Construction of Gully Trap with material including, excavation, 4" size uPVC P-trap CC base CI cover with frame, CC benching water proof internal plaster inlet/out connections , complete in all respects.				
i.	Type GT, Size 15"x15" (15 Kgs)	Nos.	5		
		Sub Total:			

Sukkur IBA University
IBA Community College, Jacobabad
SUMMARY OF BILL OF QUANTITIES
PLUMBING SYSTEM

S. NO.	DESCRIPTION		AMOUNT
1	SECTION - 01 PROVIDING & FIXING OF PLUMBING FIXTURES	Rs.	
2	SECTION-02 WATER SUPPLY SYSTEM.	Rs.	
3	SECTION-03 SOIL, WASTE VENT AND RAIN WATER DRAINAGE SYSTEM	Rs.	
4	SECTION-04 EXTERNAL SEWER SYSTEM	Rs.	
	TOTAL COST OF PLUMBING SYSTEM		

SUKKUR IBA UNIVERSITY
IBA COMMUNITY COLLEGE (Jacobabad)
LIST OF APPROVED MATERIALS

S.No.	ITEM	MAKE
1	European Wc (wall Hang)	Imperial Tiles (Code-017 Belair)
2	Concealed Flush Tank	GEBERIT
3	Asian Type Wc	Porta (HD-13)
4	Low down Flush Tank	Porta (HD-3)
5	Wash Basin Counter top	Porta (HD-3)
6	Urinal	Imperial Tiles (Code-2027 Bloomingdale)
7	Urinal Flush Valve	Grohe
8	Basin Mixer	Zilver ED-109
9	Toilet Paper Holder	Zilver 006-2
10	Coat Hook	Zilver 033-1
11	Soap Dish (Essential Cosmopolitan)	Imperial Tiles (Code-BA4701)
12	Bibcock	Zilver ES03F
13	Tee Stop Cock With Muslim Shower	Zilver GX7016 + VRHFX40NS
14	T-Stop Cock	Zilver GX7016
15	Soap Dispensor	Zilve 302C
16	Thermostatic Valve for Ablution	I-tap
17	Towel Rail	Zilver 0331-4
18	Bottle Trap	Zilver EX024
19	Polypropylene Pipe (Water Supply)	Dadex/Hepworth / Cosmoplast
20	Polypropylene Pipe Fittings (Water Supply)	Dadex/Hepworth / Cosmoplast
21	uPVC Pipe (Drainage)	Dadex/Hepworth / Cosmoplast
22	uPVC Fittings (Drainage)	Dadex/Hepworth / Cosmoplast
23	Valves	Hatersley / Kitz
24	Floor Drain / Floor Gully	Dadex/Hepworth / Cosmoplast
25	Floor Drain / Floor Clean Out S/S Grating	Alpine / Approved Equivalent
26	Teflon Tape	Imported
27	Floor Clean-Out Plug uPVC	Dadex/Hepworth / Cosmoplast
28	Vent Cowl uPVC	Dadex/Hepworth / Cosmoplast
Dealer Contact Number		
1	(PORTA)-TEL(03214013377)	
2	(GROHE)-TEL(021-353437460-6)	
3	(DADEX)-TEL(021-53597002)	
4	(COSMOPLAST)-TEL(021-35374356)	
5	(IMPERIAL TILES)-TEL(021-35871495-6)	
6	(VESBO)-TEL(021-34540510)	
7	(GROHE)-TEL(021-35840851)-(021-5841491)	
8	(Alpine G.A. Akber & Co.)TEL(021- 5374356)-(Cell: 0300-2487048)	

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

10-Oct-21

SUMMARY

TOTAL COST OF ELECTRIC WIRING

TOTAL COST OF SWITCHGEAR

TOTAL COST OF FEEDER & SUBFEEDER

TOTAL COST OF FIRE ALARM

TOTAL COST OF COMPUTER NETWORKING

TOTAL COST OF CCTV

TOTAL COST OF EARTHING SYSTEM

TOTAL COST OF ELECTRICAL WORK

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
ELECTRICAL WIRING					
1	Supply & installation of wiring of light point with 3x 1.5 sq.mm single core PVC insulated wires in 20 mm dia of PVC conduit in slabe, wall, floor or on surface mounted completed in all respect from switch to point . (All material to be selected from approved manufacturer's list)	Nos.	187		
2	Same as item # 1 but point to point	Nos.	166		
3	Same as item No. 01, above but, Ceiling fan point with fan hook steel box or exhaust fan point complete in all respects.	Nos.	123		
4	Providing & Installation of Ceiling fan with fan hook Size 56" complete with all fixing accessories, (Make: Pak Fan / GFC / Royal Fan)	Nos.	123		
5	Providing & Installation of 12" size exhaust fans with louvers. (Royal Fan ,Pak Fan,GFC)	Nos.	10		
6	Providing & installation of gang switch CLIPSIL /MK/LEGRAND make with 16 SWG sheet steel box mounted concealed surface.				
a	1 Gang 10A	Nos.	1		Rate only
b	2 Gang 10A	Nos.	26		
c	3 Gang 10 A	Nos.	8		
d	4 Gang 10 A	Nos.	21		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
e	5 Gang 10 A	Nos.	4		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
f	6 Gang 10 A	Nos.	1		
g	2 Gang 10A 2way switch for stairs	Nos.	4		
h	10A Ceiling Fan dimmer with Switch	Nos.	72		
7	Providing, wiring & circuits for light points from distribution board to respective switch boxes as shown on the drawing wired with 3x2.5mm ² S/C PVC insulated cable in 20mm dia PVC conduit or PVC channel at slab/wall/column, complete with all conduit & wiring accessories. (All material to be selected from approved manufacturer's list)	Nos	36		
8	Providing & wiring of 15 Amps 3 pin power socket outlet wired with 3x4mm ² PVC insulated cable in 25mm dia PVC conduit or PVC duct recessed in wall/floor, complete will all conduit & wiring accessories (All material to be selected from approved manufacturer's list)	Nos	25		
9	Same as item 8 but outlet to outlet	Nos	1		Rate only
10	Providing, fixing & connecting of CLIPSAL/MK/LEGRAND make 15 Amps, 3 pin switch socket outlet complete with appropriate size 1.5mm thick sheet steel back box recessed in wall.	Nos.	2		
11	Providing & wiring of 5 Amps 3 pin power socket outlet wired with 3x2.5 mm ² PVC insulated cable in 25mm dia PVC conduit or PVC duct recessed in wall/floor, complete will all conduit & wiring accessories (All material to be selected from approved	Nos.	19		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
12	Same as item 11 but outlet to outlet	Nos.	61		
13	Providing, fixing & installation of CLIPSAL/MK/LEGRAND make 5A 2/3 pin switch socket outlet. with 1.5 mm thick sheet back box complete with all accessories	Nos.	80		
14	Providing & wiring of 13 Amps 3 pin power socket outlet wired with 3x2.5 mm ² PVC insulated cable in 25mm dia PVC conduit or PVC duct recessed in wall/floor, complete will all conduit & wiring accessories (All material to be selected from approved	Nos.	15		
15	Same as item 13 but outlet to outlet	Nos.	31		
16	Providing, fixing & installation of 13 Amps flat pin switch socket outlet Duplex (Clipsil) with 1.5 mm thick steel sheet back box complete with all accessories	Nos.	46		
17	Providing & Laying of Coaxial cable RG-6 in 25 mm dia PVC conduit for LCD Plasma Screen including TV socket with 1.5 mm thick back box of Clipsil make (All material to be selected from approved manufacturer's list)	Nos.	4		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
18	Providing & installation of LED Light Fixtrure PHILIPS LED SMART BRIGHT PANEL 297X1197MM (minimum 50000 hours life & latest generation model as approved by engineer)	Nos.	167		
19	Providing & installation of LED Down Light Fixtrure Philips Make LED Down Lighter 10W (Surface) (minimum 50000 hours life & latest generation model as approved by engineer)	Nos.	81		
20	Providing & installation of Emergency Light Re-chargable ,Menvier 8 Watts Kwiklite k8N or Marshall AEC 801 or equivalent (minimum 50000 hours life & latest generation model as approved by engineer)	Nos	1		
21	Providing & installation of LED Down Light Fixtrure Philips Make LED Down Lighter 6W (Surface) (minimum 50000 hours life & latest generation model as approved by engineer)	Nos.	58		
22	Providing & installation of Philips Make Bulk Head Light with 1x15W LED Blub (minimum 50000 hours life & latest generation model as approved by engineer)	Nos.	24		
23	Providing installing & wiring for split unit from distribution board to respective switches and indoor to outdoor unit with 2x6mm ² + 1x4mm ² S/C PVC cable in 25mm dia conduit, complete with all accessories including termination. (All material to be selected from approved manufacturer's list)	Nos	35		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
24	Providing installing & Connecting of 20 A DP Circuit breaker in power coated mettllic box for split units	Nos.	35		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
25	Providing installing & wiring for 10W Ceiling Speaker with 2.5mm ² 2core CU/PVC cable in 25mm dia pvc conduit, complete with all accessories. complete in all respect	Nos.	12		
26	Providing installing & Connecting of 10W Ceiling Speaker (Approved make) complete in all respect	Nos.	12		
27	Providing installing & wiring for bell & bell bush with 2x 1.5mm ² 1core CU/PVC cable in 25mm dia pvc conduit, complete with all accessories. complete in all respect	Meter	26		
TOTAL					

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
	SWITCHGEAR				
	<p>Supply, Installation, testing & commissioning of following Distribution Boards as shown on drawing made with 14 SWG sheet steel housing including all installation accessories such as Rawal bolt etc. Complete in all respects.</p> <p>Note: (Refer Single Line Diagram)</p> <ol style="list-style-type: none">1) All the DB should be front accessible and maintainable.2) Cost of Lighting Control Relays & Power Supplies should be Included in Distribution Boards .3) The transportation and placement of DBs upto dedicated location is also included in the work scope, complete in all respects including leveling, grouting etc.4) Laser engraved tags required as mention in SLDs5) Space for circuit tagging required with permanent installation on protective sheet via rivets6) 20% space required in DB for future provision7) Tin platted Imported Cu bus bar with heat shrink color coded sleeves to be used.8) Hindged protective metallic door required with knob/handle.9) Braided Door earth required.10) Lockable handle required for main door.11) As-built drawing pocket.12) Cable hanging arrangement. <p>Minimum One Year Warranty Required from date of successful commissioning on site.</p>				

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
1	Providing, Installation, testing and commissioning of MAIN D.B , 2mm thick sheet steel fabricated floor mounted water tight weather proof suitable for 3 phase, 415V, 4 wire, 50 Hz, A/C system as per drawing (as per drawings E-15) as per instruction of Electrical Consultant.	No.	1		
2	Providing, Installation, testing and commissioning of 62.5 KVAR 3phase Automatic power factor improvement plant to be installed adjacent in MAIN D.B comprising of all necessary sensing and switching relays contractors, banks of capacitors (Nokian make) suitable for operation at 400/450v 50Hz Control voltage 230v 50Hz switching in and out the capacitors in 3steps 3stage rective power control relay with digital power factor indication meter selector switch manual/auto/off indication lamps push buttons hrc fuses of suitable rating contactors for capacitors control, fuses auxiliary contactors for capacitors all necessary materials complete in all respects. as per drawing & as per instruction of Electrical Consultant. as per drawing E-15	No.	1		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
3	Providing, Installation, testing and commissioning of Lighting Distribution Board L.DB-1 1.5mm thick sheet steel fabricated wall mounted recessed type as per site condition suitable for 3 phase, 4 wire, 50 Hz, A/C system as per Drawing E-14	Nos	1		
4	Providing, Installation, testing and commissioning of Lighting Distribution Board L.DB-2 1.5mm thick sheet steel fabricated wall mounted recessed type as per site condition suitable for 3 phase, 4 wire, 50 Hz, A/C system as per Drawing E-14	No	2		
5	Providing, Installation, testing and commissioning of Power Distribution Board P.DB A/C-1 1.5mm thick sheet steel fabricated wall mounted recessed type as per site condition suitable for 3 phase 4 wire 50 Hz A/C system as per Drawing E-14	No.	1		
6	Providing, Installation, testing and commissioning of Power Distribution Board P.DB A/C-2 1.5mm thick sheet steel fabricated wall mounted recessed type as per site condition suitable for 3 phase 4 wire 50 Hz A/C system as per Drawing E-14	No.	1		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
7	Providing, Installation, testing and commissioning Power Distribution Board (P.DB U.P.S-1) 1.5mm thick sheet steel fabricated wall mounted recessed type as per site condition suitable for 3 phase, 4 wire, 50 Hz, A/C system as per Drawing E-14	No.	1		
8	Providing, Installation, testing and commissioning of 300A 4pole ATS Panel as per drawing E-15 1.5mm thick sheet steel fabricated wall mounted recessed type as per site.	No.	1		
9	Providing & installation of 02 nos 32 Amps three phase 5 Pin industrial sockets(CLIPSIL) in 1.5 mm thick M.S box for UPS	Job	1		
10	Providing & laying of following size PVC conduit buried in ground or concealed in wall/floor, or surface as required including all conduit accessories for Electrical/Tel system complete as per drawing and specification.				
10.1	38mm dia pvc pipe class-D	Mtr	115		
10.2	50mm dia pvc pipe class-D	Mtr	65		
10.3	150mm dia pvc pipe class-D	Mtr	50		
11	Providing & installing of Metal pull box 1.5mm thick sheet steel powder coated size 12"x12" and 3" deep with cover	Nos	10		

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
12	Providing and Construction of Hand hole size 24"X24" & 36" Deep. With Water proof C.I Cover complete in all respect.	Nos	1		Rate only
TOTAL					

IBA COMMUNITY COLLEGE**JACOBABAD**

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

10 JAN, 2019

Item no.	Description	Unit	Quantity	Rate	Amount
FEEDER AND SUB- FEEDER					
1	Providing, laying, testing and commissioning of following size single or multicore PVC/PVC cable 600/1000 volts grades in suitable PVC conduit concealed in floor / wall as shown on drawings (Make: Pakistan Cables, Pioneer Cable ,Newage Cable)				
1.1	4 core 120mm ² XLPE /pvc/pvc + 2x70mm ² S/C core PVC cable. As E.C.C	Mtr	50		
			as per site		
1.2	4 core 35mm ² XLPE / pvc/pvc + 2x16mm ² S/C core PVC cable. As E.C.C Run in PVC pipe class D 50 mm dia	Mtr	48		
1.3	4 core 25mm ² XLPE / pvc/pvc + 2x16mm ² S/C core PVC cable. As E.C.C Run in PVC pipe class D 50 mm dia	Mtr	78		
1.4	4 core 10mm ² pvc/pvc + 2x6mm ² S/C core PVC cable. As E.C.C Run in PVC pipe class D 38 mm dia	Mtr	48		
1.5	4 core 6mm ² pvc/pvc + 2x4mm ² S/C core PVC cable. As E.C.C Run in PVC pipe class D 38 mm dia	Mtr	20		
TOTAL					

IBA COMMUNITY COLLEGE**JACOBABAD**

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
Addressable FIRE ALARM SYSTEM					
1	Supply, installation, testing & commissioning of Addressable Fire Alarm System comprising of following equipments including all accessories required for the completion of the system in all respects.				
a	Supply and wiring of 2C, 1.5 Sq.mm Fire Resistant Shielded Cable (Fire rating for 2 hours at 950 C) in 25mm dia PVC conduit from fire alarm control panel to all sensors & devices including all installation accessories complete in all respect.	Mtrs.	1100		
2	Providing , installation & testing of follwing fire detection devices & system				
a	Addressable Smoke Detectors incorporating an LED indication located in labyrinth with in the housing of the detector. Sensing of the detector shall be adjustable via software between 0-90 seconds. The detector shall have built in short circuit isolators on both inputs.	Nos	38		
b	Addressable Heat Detectors incorporating an LED indication located in labyrinth with in the housing of the detector. Sensing of the detector shall be adjustable via software between 0-90 seconds. The detector shall have built in short circuit isolators on both inputs.	Nos	3		

IBA COMMUNITY COLLEGE**JACOBABAD**

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
C	Addressable Break Glass Type Manual Call Point having a built in short circuit isolator and built in microprocessor to ensure a response time of max 1 second. It also incorporates an indication LED, flashed after pressing the button to acknowledge the activation and a key operation facility for testing purposes.	Nos	6		
d	Addressable Type Indoor Loop Powered electronic sounder and minimum sound out put 100 dB at 1 meter with frequencies for variety of sounds as required. Souder shall be loop wired and loop signaled , built in short circuit isolator, configured via software.	Nos	6		
3	Addressable Fire Alarm Control Panel of 4-Loops expandable upto 6 loops shall be self powered with built in 12V batteries for 24 Hrs backup with charging unit. It can be programmed using Windows based software for peripheral devices like display unit, printers etc.	Nos	1		
4	Testing & commissioning of the system by approved agent of the system supplied	Job	1		
TOTAL					

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
COMPUTER NET WORKING SYSTEM					
	Supply, installation, testing & commissioning of following items for Voice and Data Communication System including all material, labor, tools, accessories etc. Complete in all respects. Quantities for cables shown in BOQ are estimated and taken from drawings. Contractor is advised to take measurement at site before commencement of works. Different colors of voice and data cables shall be used. (Cisco -X Series)				
1	CAT-6a UTP cables , for Data communication system from Communication Rack-1,2 to each workstation in 25mm dia PVC conduit including termination and tagging at both ends. Complete in all respects. (Coil = 500 m length)	Nos	8		
2	Providing & fixing 48 ports patch panel with 42U rack for computer data Networking system with all fixing & Mounting accessories of same brand,exhaust fan etc 3M /Clipsal	Nos	2		
3	Providing & fixing of Computer Junction Box 12"x12"x3" powder coated ,16 SWg sheet steel Box	Nos	2		
4	Front Cable Organizer for Voice & Data patch panels / wiring blocks with complete labeling and dressing for incoming cable management.	Nos	2		
5	Following CAT-6a, factory certified patch cords of specified color having RJ-45 connectors at both ends for data .				
a)	3 meter long.	No.s	44		
b)	1 meter long.	No.s	25		
6	Fluke testing of whole networking system	Job	1		
a)	Duplex Face plate having 1 No. CAT-6 RJ-45 I/O for Voice and 1 No. CAT-6a RJ-45 I/O for Data, white/off white finish, complete with shuttered click-ins, labels and all accessories including back box.	No.s	10		

b)	Simplex Face plate with 1 Gang CAT-6a RJ-45 I/O for Data, white/off white finish, complete with shuttered click-ins, labels and all accessories including back box.	No.s	48		
7	Communication Rack 42U (Floor Mounted) , 19 inches suitable for installation of standard patch panels and etc. Complete with floor base, vertical cable managers. Rack shall be equipped with power distribution units (PDU s) with at least 5 imported power sockets etc. Complete in all respects.(toten Racks)	Nos	2		
8	Supply & installation of local (Clipsal) made PDU	Nos	2		
TOTAL					

NOTE-1:

- 1 Below mentioned points should be submitted to IT & branch Manager for record purpose in proper printed file.
- 2 Vendor has to submit detail Fluke testing report at each node in shape of Hard Copy. During Evaluation/testing of
- 3 Final Layout Plan (Hard Copy) including Network Cable Routing. One copy of Layout should be laminated and
- 4 Pictures of Data Cabinet & Branch (Hard Copy)
- 5 20 years Certificate (properly hang near cabinet on some visible place)
- 6 Cabinet height should be 5 feet from floor (measuring from top of cabinet) so that it can be managed by a normal
- 7 Network Cable should be laid in separate ducts, conduits or pipes from power cable.
- 8 Separate Box for Network Faceplate from Power Sockets at user end.
- 9 IT cabinet should only be used for IT equipment. Telephone exchange installation should be far enough from IT
- 10 Before placing the IT cabinet in the branch, please consult concern Manager IT Infrastructure for better direction of better placement.

IBA COMMUNITY COLLEGE

JACOBABAD

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

10 JAN, 2019

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
CC-TV SYSTEM					
	Supply, testing and commissioning of following items for IP Based CCTV System including but not limited to the description given here under including all power and communication accessories, housings, mounting brackets, suspension rods etc. required for completion of the system.				
1	Supply & Wiring of Cat-6 Cable for CCTV system in 25mm dia PVC conduit from camera to Network Switch & Network switch to Server Room as per drawings including termination and tagging at both ends. Complete in all respects.(Coil =305 Rm.)	Mets	5		
2	Wall mounted fixed type PoE Powered I.P Box Camera with day and night feature with 2-MP (1920 x 1080) with live and recording quality of minimum 15 fps. Varifocal Lens 3.3-12mm, along with all mounting accessories complete in all respect as per drawing and specification.	Nos	16		
3	Network Video Recorder (NVR) with 32 channel Video input. The NVR shall be equipped with LAN / WAN facility. NVR should have minimum 15 days storage capacity on 25 frame per second with 1 No. 24 TB HDD or higher if required to cater 100% cameras, RW CD Drive. Complete with all connecting cords and accessories including SFP modules.	No.	1		
4	42" LED Color Screen t to be installed in control Room in racks with all connecting cords and mounting stands.	Nos	1		
5	24-Port Giga Bit Data Switch	No.s	1		
6	08-Port PoE Switch		3		
7	Testing & commissioning of the system by approved agent of the system supplied	Job	1		
TOTAL					

IBA COMMUNITY COLLEGE**JACOBABAD**

Electrical, Telephone, Data, Cc-tv, Fire Alarm & Split units System Works

Bill of Quantities

Item no.	Description	Unit	Quantity	Rate	Amount
	H. EARTHING SYSTEM				
	Supply, installation, testing and commissioning of following items for earthing system for lightning protection and grounding of other systems including all material, boring, labor, tools, transportation, accessories etc. Complete in all respects with detailed test reports.				
1	Chemical Enhanced Earth using 28 mm dia copper pipe filled with soil conditioning material including 6" dia, 11' deep boring and back filled chemical to enhance conductivity. Complete with termination clamps, 12" dia heavy duty tin plated round cover as per details given in drawings.	Nos	3		
2	Earth Connecting Point (ECP) or Equipotential bar made with 375 mm wide, 75 mm high and 5 mm thick tin plated Copper, as shown in drawings. Bar shall be provided with holes suitable for installation of 4No. 70 sqmm bare copper conductor. ECP shall be enclosed in appropriate size of powder coated metal enclosure with front accessible cover.	No.s	3		
3	Supply, installation and connection of the following PVC insulated earthing conductors in PVC pipe of required size	Mtr	184		
b	2x1C-16mm ² PVC cables (Green)	Mtr	78		
	1x1C-10mm ² PVC cables (Green)				

GENERAL SOURCE OF SUPPLY OF MATERIAL/ GENERAL NOTES
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1. Bricks in Pacca brick works used in sub structure/ structure will be from Rahim Yar Khan (A-I Quality, approved by Client)
2. Bricks in face brickwork will be from Lahore. (A-I Quality, approved by Client). Pigment should be mixed in mortar for face brick work, every layer should be properly stuck out/grooved by 3/8" Patti.
3. Fine aggregate (Hill sand) will be from **Bholari** quarry.
4. Coarse aggregate (Crush stone, Ballast) will be from **Ubhan Shah** Quarry.
5. Deformed Steel from Karachi (60 grade steel by Amereli/Razaq) will be used, no any rust will be allowed, and at site steel must be covered with plastic covers to save it from humidity/moisture.
6. DG (OPC/SR) cement (Manufactured at Dera Ghazi Khan) will be used in all construction work. Proper and adequate steps must be taken for curing.
7. New Steel/marine ply shuttering will be used for RCC work in, columns, beams and slab.
8. Up to plinth level Sulpahte Resistant Cement (DG) will be used
9. All material to be used will be laboratory tested along with authentication certificate and finally selected by the client/ Consultant.
10. Use of vibrator is must in every RCC work.
11. Before execution of any activity, shop drawings must be submitted for its approval, than execution, if required sample should be prepared for approval.
12. Batch plant/ Semi Auto mixers shall be used in cementing work.
13. Before start of work proper work schedule for completion on Bar Chart, CPM, PERT or on any software based planning schedule for whole project must be submitted, along with this a fortnightly schedule to monitor and evaluate the progress of work.
14. Qualified and Experienced Engineer must be available at site.
15. Contractor must establish site office for Client execution Staff, along with site material testing lab for material testing.
16. Check requisition should be submitted for any site activity, after approval work should be executed at site.

17. All plumbing and electrical work of said building must be done by reputable licensed contractor, approved by Client and consultants.

18. All safety measures for Staff, HSE based PPE's and complete site barricading, surrounding property etc. must be taken as asked by Client.

Name of firm/Contractor: _____

Seal and Signature of Contractor: _____

Date: _____

S.#	MANUFACTURER	CONTACT NO.	CONTACT PERSON
1	LV Panels & Distribution Boards		
	Hussain & Co.	021-3636-7002 0333-2315658	Mr. Raza Hussain
	HRA Switchgears		Mr. Shuja
	Sunbeam Engineers	0333-7272378 021-35061083-752	Mr. Nouman Sheikh
2	Lighting Fixtures		
	Philips	021-35382992 0300-8285975	Mr. Zaheer Sultan
3	Low Voltage Wires and Cables (LSZH)		
	Pakistan Cables	021-3256-1170 ,75 0301-2844690	Mr. Wasim
4	Switches , Sockets & Dimmers		
	Schneider, (Clipsal Pakistan)	021-111-081-081 0301-8201906	Mr. Faraz
	Legrand, MegaPlus	021-111-003-355 0331-2934321	Mr. Mehmood
	MK, (Leiamra Engineering)	021-34558611-12 0300-2318227	Mr. Shoaib
5	PVC/UPVC Conduits & Accessories		
	Pak Arab		
	Dadex	111-000-789 021-3431-3881	Ms. Samra
6	Cable Lugs		
	3M	021-3263-6011 0321-2555010	Mr. Habib ur Rehman
	Cembre	021-3536-0916 0300-2008982	Mr. Moazzam
	Prysmian	0321-2554234 0334-3086609	Mr. Shahzaib Ahmed
7	GI/Steel Conduits & Accessories		
	International Industries Limited (IIL)	021-32313508	Mr. Azam
8	Cable Trays / Ladder & Accessories		

S.#	MANUFACTURER	CONTACT NO.	CONTACT PERSON
	Hussain & Co.	021-3636-7002 0333-2315658	Mr. Raza
	Zain Lighting	021-3666-9967 0321-9200546	Mr. Ejaz
	Ezzi Engineering		
9	Linear Aluminum Channels / Wall Trunking		
	Japan Metal Industries	0312-1006233	Mr. Babar
	Zain Lighting	021-3666-9967 0321-9200546	Mr. Ejaz
10	MS Back Boxes / Ceiling Pull Boxes (Local)		
	Hussain & Co.	021-3636-7002 0333-2315658	Mr. Raza
	Falcon Engineering	021-3507-4719 0321-2449043	Mr. Saleem Siddiqui
11	Floor Service Outlet Boxes (Imported)		
	Davis (Clipsal Pakistan)	021-111-081-081 0301-8201906	Mr. Faraz
	MK, (Leimra Engineering)	021-3455 8611-12 0300-2318227	Mr. Shoaib
	Legrand (Mega Plus)	021-34300872~3 0346-2759190	Mr. Abdul Yasir
12	Junction /Pull Boxes Imported		
	S.A Hamid & Co. (Hensel , Germany)	0301-8472264 42-3594-9261	Mr. Shahzad Latif
	Zain Lighting	021-3666-9967 0321-9200546	Mr. Ejaz
13	Industrial Sockets and Isolators		
	Gewiss (Overseas Enterprise)	021-35891691-94 0300-8416328	Ms. Mona Zubedi
	Schneider, (Clipsal Pakistan)	021-111-081-081 0301-8201906	Mr. Faraz
	S.A Hamid & Co. (Walther, Germany)	0301-8472264 42-3594-9261	Mr. Shahzad Latif
14	Network Cables / Voice and Data & Equipments		
	Actasi by Schneider (Clipsal Pakistan)	021-111-081-081 0308-2229597	Mr. Jahanzaib Inam

S.#	MANUFACTURER	CONTACT NO.	CONTACT PERSON
	Commscope by Infracol	0300-8263664 0317-7111020	Mr. Rahim
	Leviton (USA) by HK Shah	021-35670406 021-35671570	Mr. Mujtaba
	3M,USA (3M-Pakistan)	021-3263-6011 0321-2555010	Mr. Habib ur Rehman
15	Communication Racks (Improted Brand)		
	Schneider (Clipsal Pakistan)	021-111-081-081 0308-2229597	Mr. Jahanzaib Inam
	Commscope by Infracol	0300-8263664 0317-7111020	Mr. Rahim
	Leviton (USA) by HK Shah	021-35670406 021-35671570	Mr. Mujtaba
	3M,USA (3M-Pakistan)	021-3263-6011 0321-2555010	Mr. Habib ur Rehman
16	Fire Alarm System (Wiring Only)		
	Prysmian, FP Plus (Solution Cloud)	0321-2554234 0334-3086609	Mr. Shahzaib Ahmed
	Cavicel SR 114E (C-XOR)	042-35446195 0300-8477751	Mr. Aamir Kardar
	Ramcro by Secure Vision	021-34830466 0301-8502042	Mr. Ahmed Ali
17	Public Address System (Wiring Only)		
	Pakistan Cables	021-3256-1170 ,75 0301-2844690	Mr. Wasim
18	Fire Alarm System		
	Zeta, UK (Secure Vision)	021-34830466 0301-8502042	Mr. Ahmed Ali
	Bosch, Kingdom International	021-3452-8801 0336-8225515	Mr. Yasir Azam Hashmi
	IAS Morley by Honeywell (UK) by Telecom Engineering	0335-3035765 0345-2778965	Mr. Mirza Atiqullah
	Schrack by HK Shah	021-35670406 021-35671570	Mr. Mujtaba
19	Public Address System		
	TOA (Secure Vision)	021-34830466 0301-8502042	Mr. Ahmed Ali
	Bosch, Kingdom International , It should be replaced with BOSE		jamil Ansari

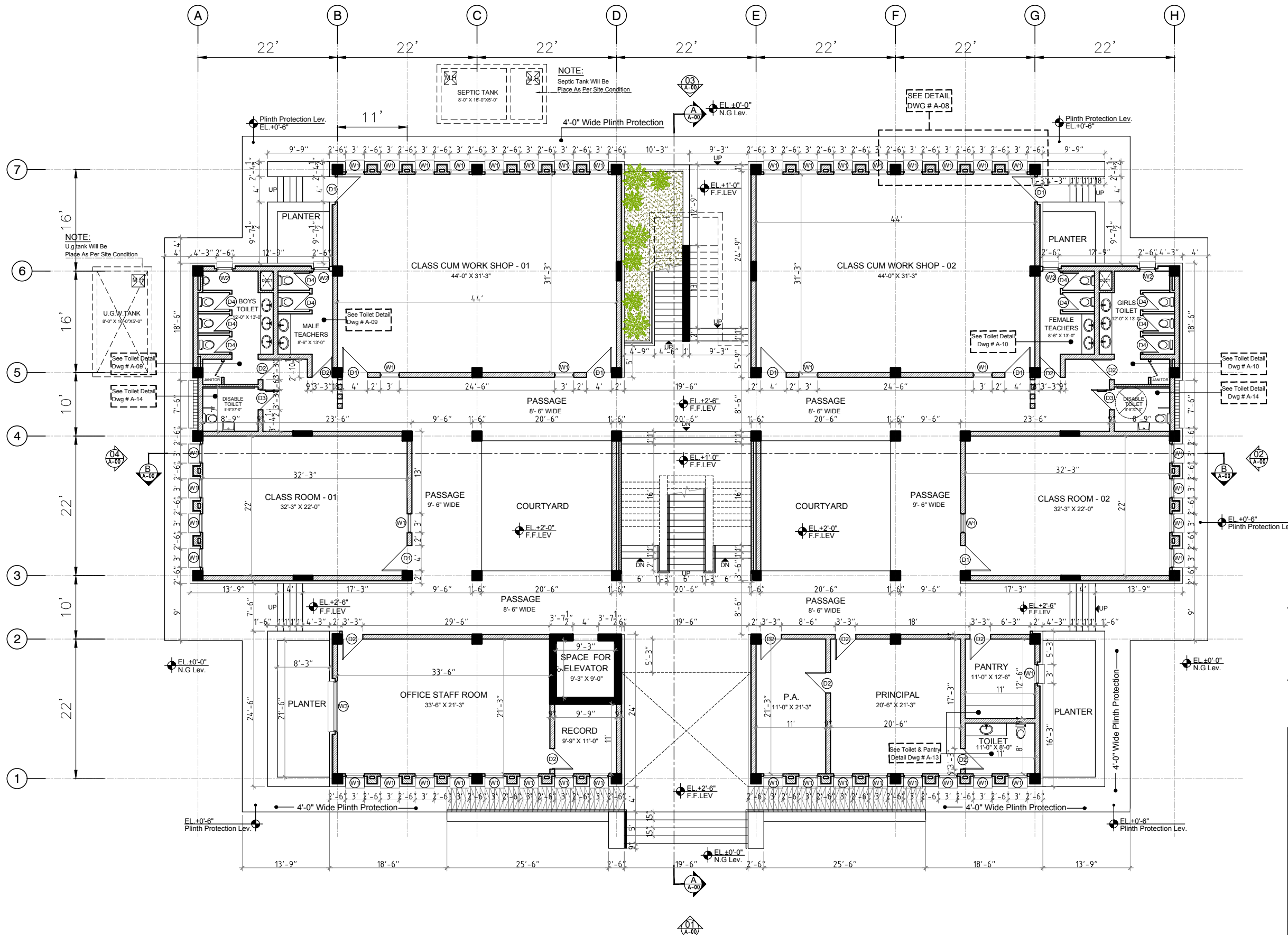
S.#	MANUFACTURER	CONTACT NO.	CONTACT PERSON
	Honeywell (USA) by Telecom Engineering	0335-3035765 0345-2778965	Mr. Mirza Atiqullah
20	IP Based CCTV System		
	Honeywell Equip Series, Telecom Engineering	0335-3035765 0345-2778965	Mr. Mirza Atiqullah
	Bosch, Kingdom International	021-3452-8801 0336-8225515	Mr. Yasir Azam Hashmi
	Axis (Secure Vision)	021-34830466 0301-8502042	Mr. Ahmed Ali
21	Access Control System		
	Virdi (Secure Vision)	021-34830466 0301-8502042	Mr. Ahmed Ali
	HID (USA) by Telecom Engineering	0335-3035765 0345-2778965	Mr. Mirza Atiqullah
	Bosch, Kingdom International	021-3452-8801 0336-8225515	Mr. Yasir Azam Hashmi
22	Co-axial Cables		
	Actasi by Schneider (Clipsal Pakistan)	021-111-081-081 0308-2229597	Mr. Jahanzaib Inam
	Commscope by Infracol	0300-8263664 0317-7111020	Mr. Rahim
	Leviton (USA) by HK Shah	021-35670406 021-35671570	Mr. Mujtaba
	3M,USA (3M-Pakistan)	021-3263-6011 0321-2555010	Mr. Habib ur Rehman
23	Lighting Control System		
	Schneider, Australia (Clipsal Pakistan)	021 111 081 081 0308-2228958	Mr. Hamza Shamim Siddiqui
	ABB, Germany (Zain Com)	021-3413-1304-05 0332-2233088	Mr. S.Mudassir Ali Hashmi
24	UPS / Isolation Transformers		
	ABB (S.M Jaffer)	021-111-765-765 0333-3796237	Mr. Mehmood
	APC (CNS Engineering)	21-34326707, 34311940 0322-8440899	Mr. Zubair Ahmed
	Vertiv (Silicon Technologies)	0321-8755328	Mr. Raheel Qamar
	Eaton by Greaves Pakistan	0300-2725094 0322-2937272	Mr. Anis ur Rehman

S.#	MANUFACTURER	CONTACT NO.	CONTACT PERSON
25	Enclosed Bus Assemblies		
	Schneider Electric (France) by Schneider Electric, Pakistan	021-3637-7259 0333-2384205	Mr. Farhan Malik
	Pogliano (Italy) by Jubilee Corporation	0304-2497344	Mr. Shaikh Hammad
26	Earthing System and Lightning Protection System		
	Vital Power	0300-9292966	Mr. Saleem
	Consumer Electric	021-3536-0916 0300-2008982	Mr. Moazzam
	C-XOR Engineering	042-35446195 0300-8477751	Mr. Amir Kardar
	<p>NOTE: The provided contact names and numbers are only for reference and ease of approach to the suppliers of recommended brands. They are not to be considered short listed by any means. But still the Consultant holds the right to discard any supplier, keeping in view the past record and quality of their product.</p>		

ARCHITECTURAL DRAWINGS

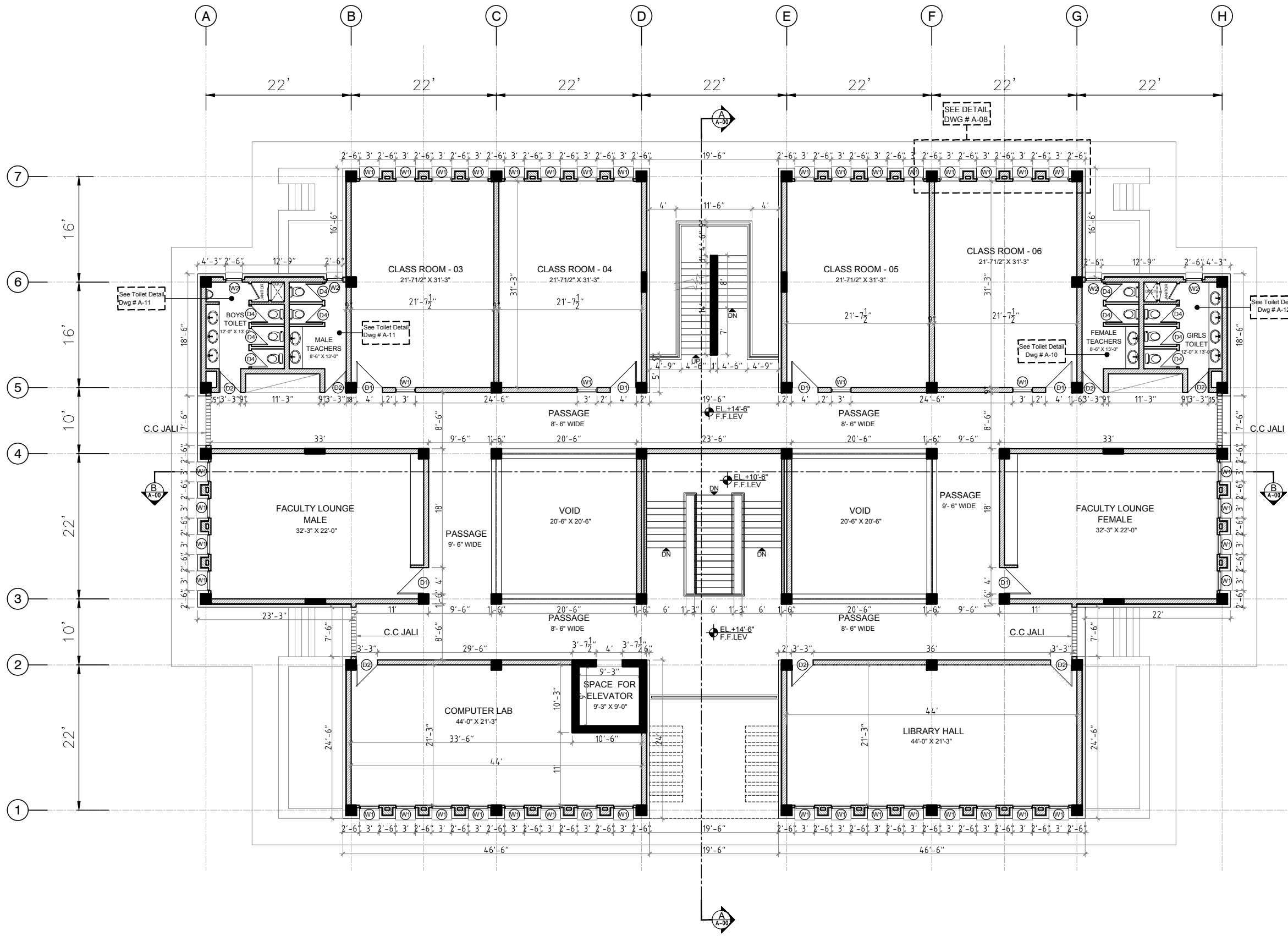
FOR TENDER

SEPTEMBER 2021



Area:
 Ground Floor : 11,782 SFT.
 First Floor : 12,053 SFT.
 Total : 23,835 SFT.

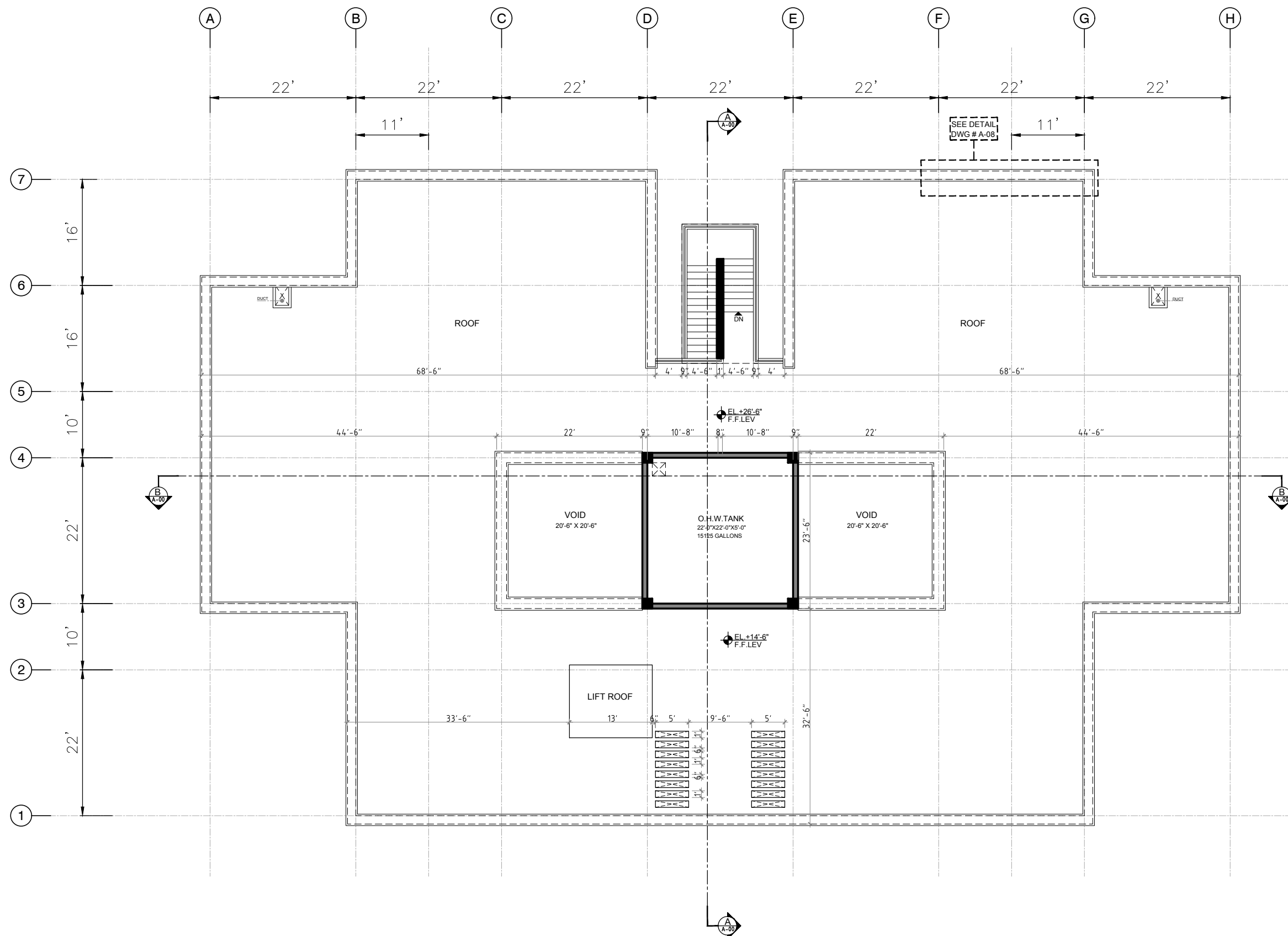
REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		
GROUND FLOOR PLAN WORKING PLAN		COMMUNITY COLLEGE
ARCHITECT:	HABIB FIDA ALI <small>ARCHITECT</small>	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES <small>DESIGN & DEVELOPMENT ENGINEERING ASSOCIATES</small>	Date Sep, 2021
ELECTRICAL CONSULTANT:	N.A. ASSOCIATES <small>DESIGN & DEVELOPMENT ENGINEERING ASSOCIATES</small>	Drawn MEHROZ
PLUMBING CONSULTANT:	N.A. ASSOCIATES <small>DESIGN & DEVELOPMENT ENGINEERING ASSOCIATES</small>	Checked ASIF USMANI
		Drawing No A-01



Area:

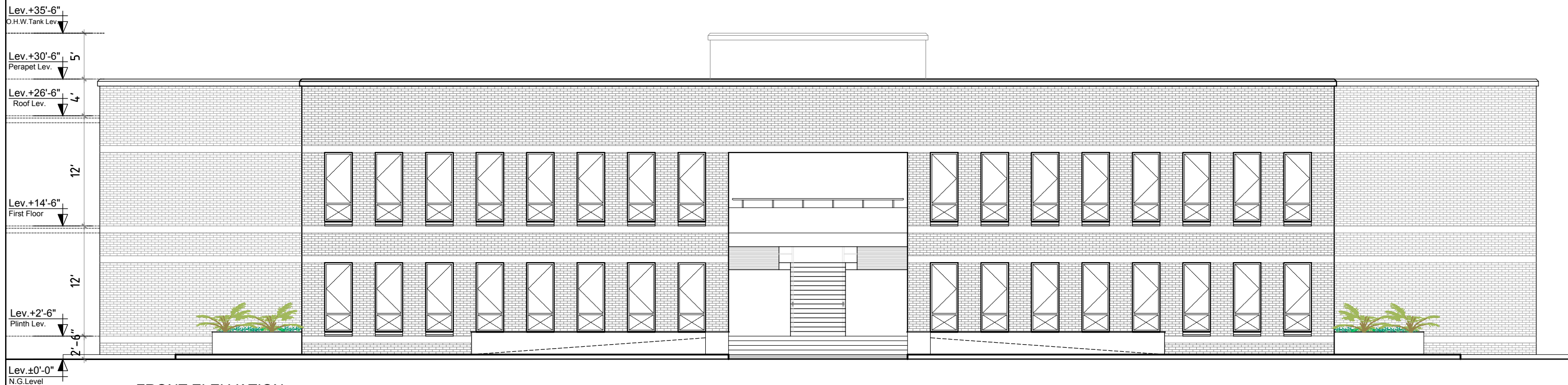
Ground Floor :	11,782 SFT.
First Floor :	12,053 SFT.
Total :	23,835 SFT.

REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		
FIRST FLOOR PLAN WORKING PLAN		COMMUNITY COLLEGE
ARCHITECT :	HABIB FIDA ALI ARCHITECT	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates	Drawn MEHROZ
PLUMBING CONSULTANT :	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-02

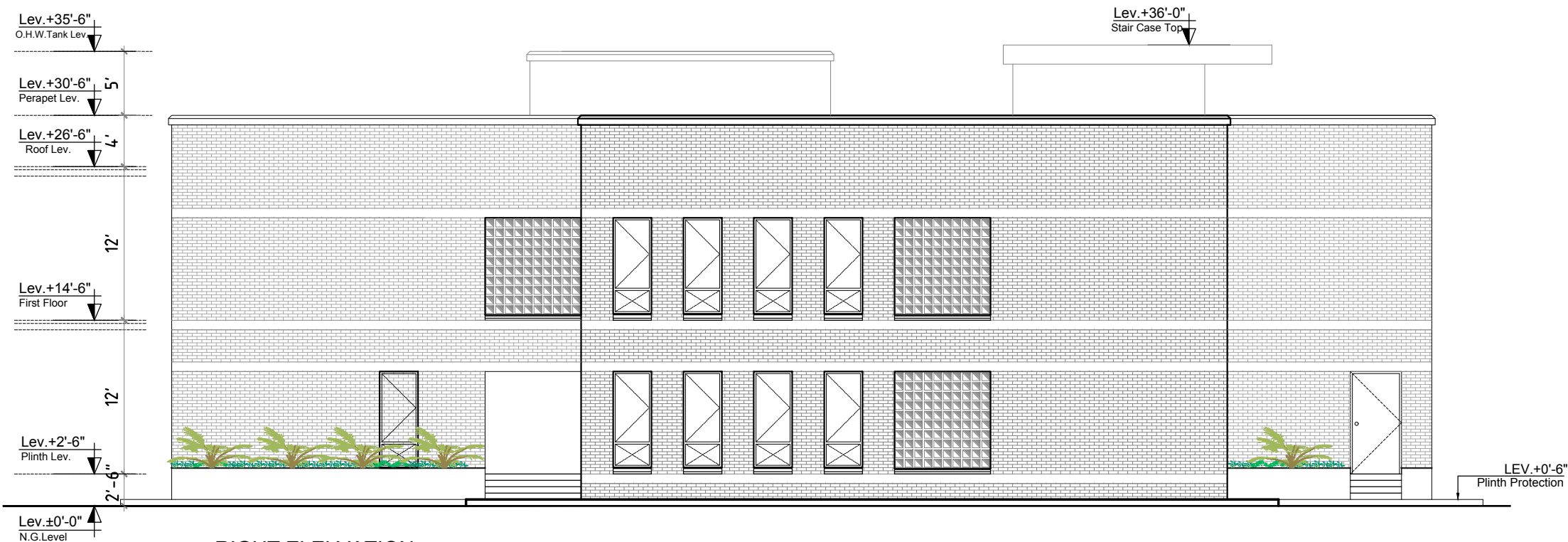


Area:
 Ground Floor : 11,782 SFT.
 First Floor : 12,053 SFT.
 Total : 23,835 SFT.

REV.	DATE	
Issued For FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
ROOF WORKING PLAN		
ARCHITECT:	HABIB FIDA ALI	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn MEHROZ
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-03

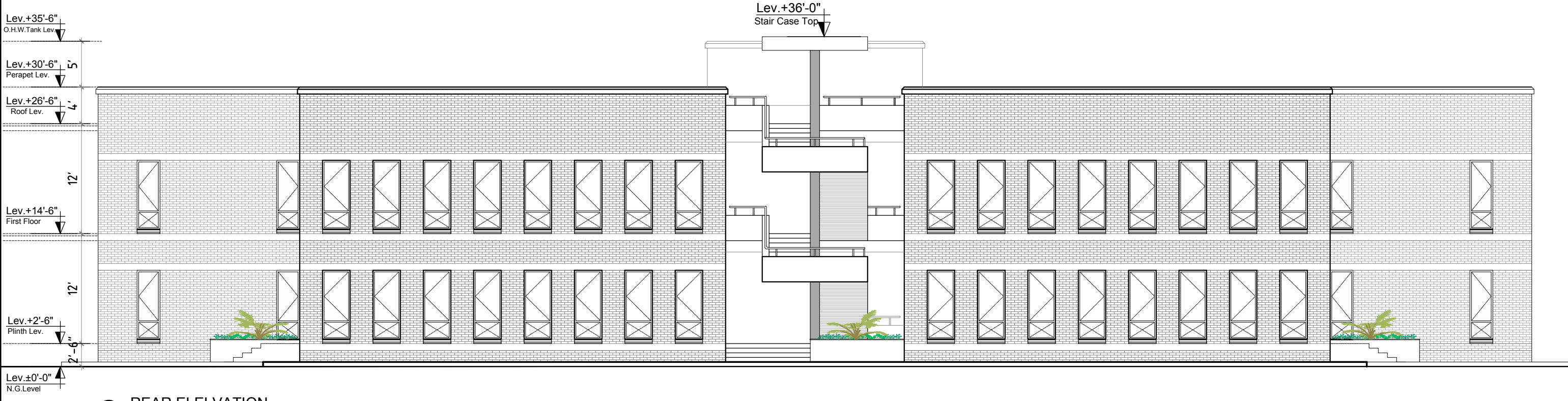


01 FRONT ELEVATION

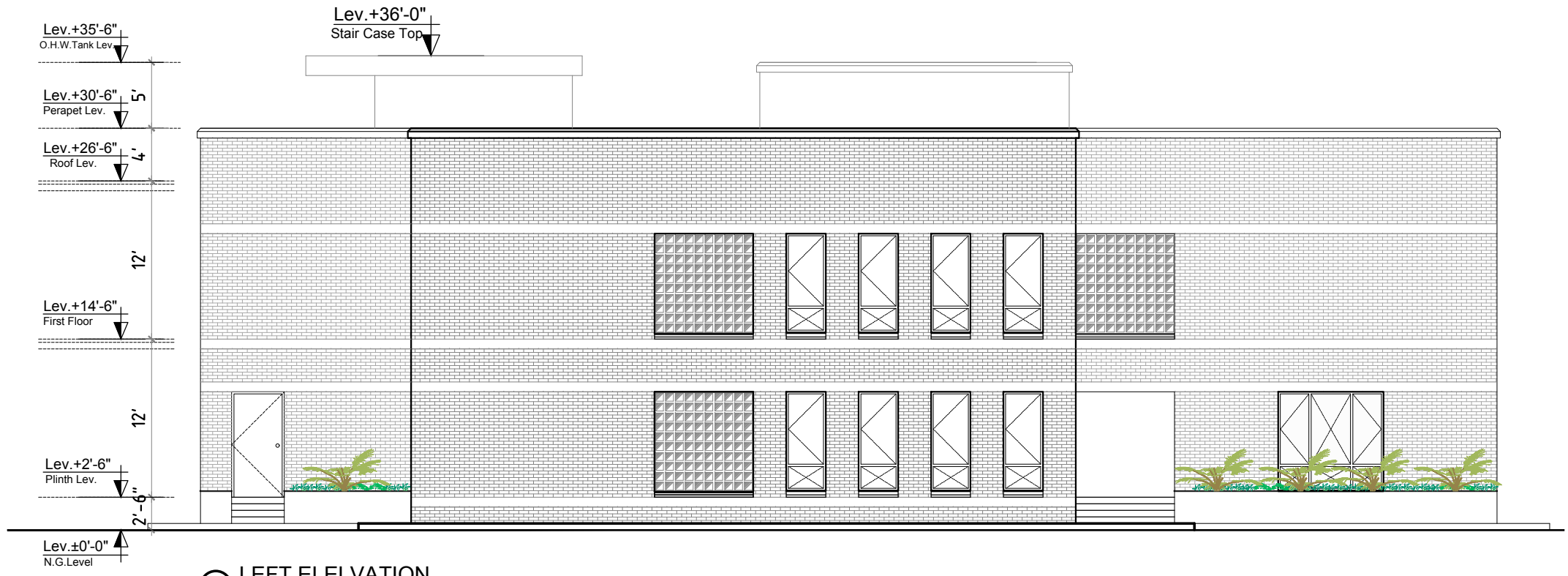


02 RIGHT ELEVATION

REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
FRONT & RIGHT ELEVATION		
ARCHITECT :	HABIB FIDA ALI Architects A-14, Dargah-e-Nizam Road Sardar Sarbajit Plaza, Sarbajit, Sialkot	Scale 3/32" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES PVT. LTD. 10/10, 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/18, 10/19, 10/20, 10/21, 10/22, 10/23, 10/24, 10/25, 10/26, 10/27, 10/28, 10/29, 10/30, 10/31, 10/32, 10/33, 10/34, 10/35, 10/36, 10/37, 10/38, 10/39, 10/40, 10/41, 10/42, 10/43, 10/44, 10/45, 10/46, 10/47, 10/48, 10/49, 10/50, 10/51, 10/52, 10/53, 10/54, 10/55, 10/56, 10/57, 10/58, 10/59, 10/60, 10/61, 10/62, 10/63, 10/64, 10/65, 10/66, 10/67, 10/68, 10/69, 10/70, 10/71, 10/72, 10/73, 10/74, 10/75, 10/76, 10/77, 10/78, 10/79, 10/80, 10/81, 10/82, 10/83, 10/84, 10/85, 10/86, 10/87, 10/88, 10/89, 10/90, 10/91, 10/92, 10/93, 10/94, 10/95, 10/96, 10/97, 10/98, 10/99, 10/100	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates PVT. LTD. 10/10, 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/18, 10/19, 10/20, 10/21, 10/22, 10/23, 10/24, 10/25, 10/26, 10/27, 10/28, 10/29, 10/30, 10/31, 10/32, 10/33, 10/34, 10/35, 10/36, 10/37, 10/38, 10/39, 10/40, 10/41, 10/42, 10/43, 10/44, 10/45, 10/46, 10/47, 10/48, 10/49, 10/50, 10/51, 10/52, 10/53, 10/54, 10/55, 10/56, 10/57, 10/58, 10/59, 10/60, 10/61, 10/62, 10/63, 10/64, 10/65, 10/66, 10/67, 10/68, 10/69, 10/70, 10/71, 10/72, 10/73, 10/74, 10/75, 10/76, 10/77, 10/78, 10/79, 10/80, 10/81, 10/82, 10/83, 10/84, 10/85, 10/86, 10/87, 10/88, 10/89, 10/90, 10/91, 10/92, 10/93, 10/94, 10/95, 10/96, 10/97, 10/98, 10/99, 10/100	Drawn MEHROZ
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Checked ASIF USMANI
Drawing No		A-04

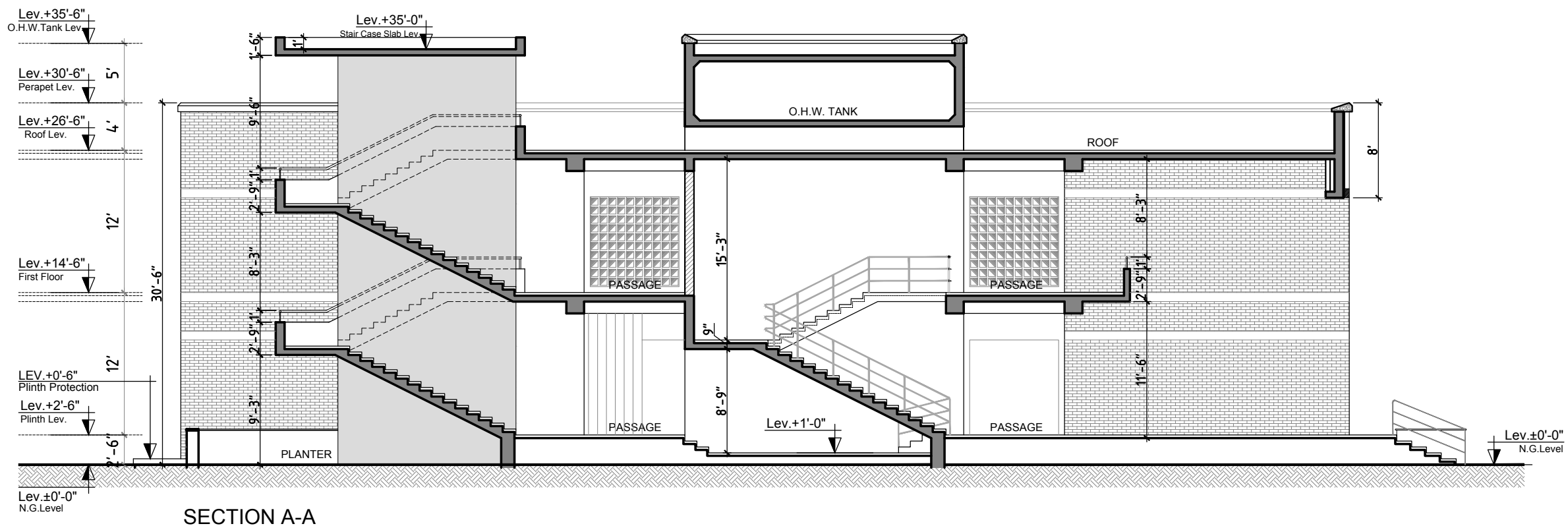
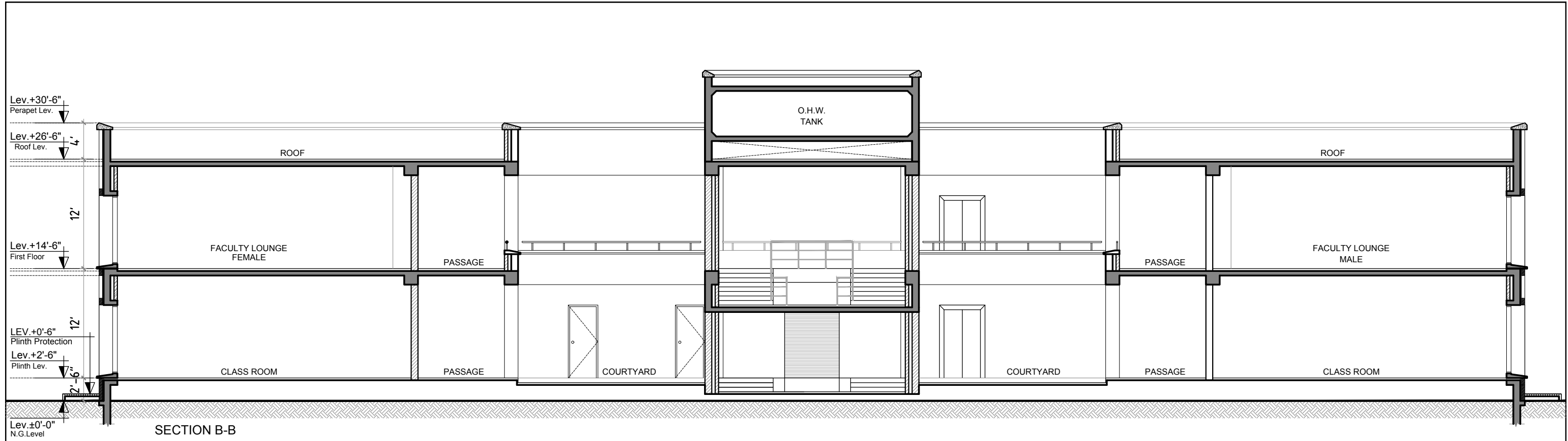


03 REAR ELEVATION

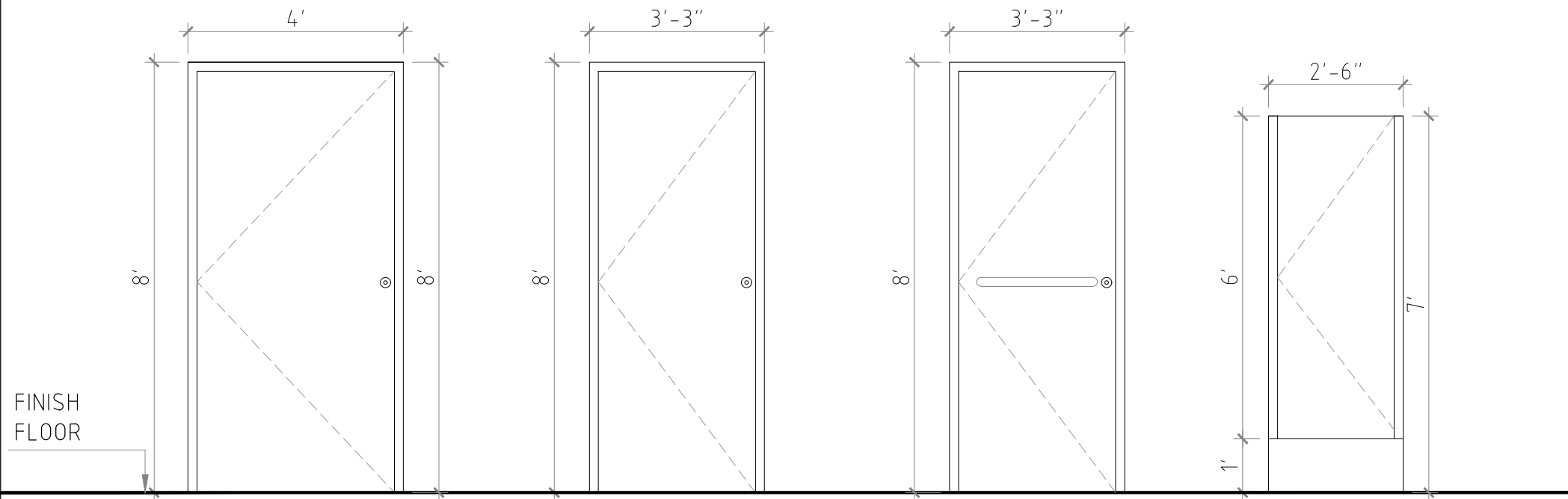


04 LEFT ELEVATION

REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
REAR & LEFT ELEVATION		
ARCHITECT :	HABIB FIDA ALI Architects 4-C/4-Block-3-Phase Road Sardar Sarbajit Plaza, Sarbajit, Sarbajit	Scale 3/32" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES PVT. LTD. 10/10-Block-3-Phase Road Sardar Sarbajit Plaza, Sarbajit, Sarbajit	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates PVT. LTD. 10/10-Block-3-Phase Road Sardar Sarbajit Plaza, Sarbajit, Sarbajit	Drawn MEHROZ
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Checked ASIF USMANI
		Drawing No A-05



REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
SECTION A-A & B-B		
ARCHITECT :	HABIB FIDA ALI Architects A-15, Dargah-e-Nizam Road Karachi East Phone: 34748818, 34747718	Scale 3/32" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Date Sep, 2021
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates Electrical & Mechanical Consultant Office: 101/102, New Market, Dargah-e-Nizam Road, Karachi Phone: 34748818, 34747718 E-mail: info@dda.com.pk	Drawn MEHROZ
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Checked ASIF USMANI
		Drawing No A-06

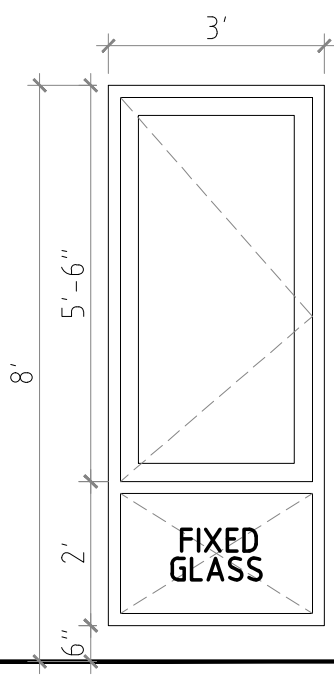


D1 ELEVATION
12 NOS

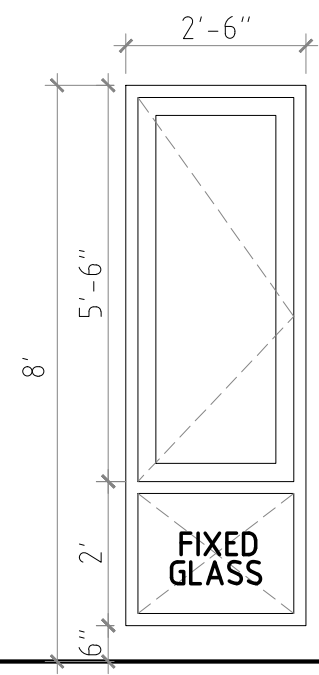
D2 ELEVATION
18 NO

D3 ELEVATION
02 NOS

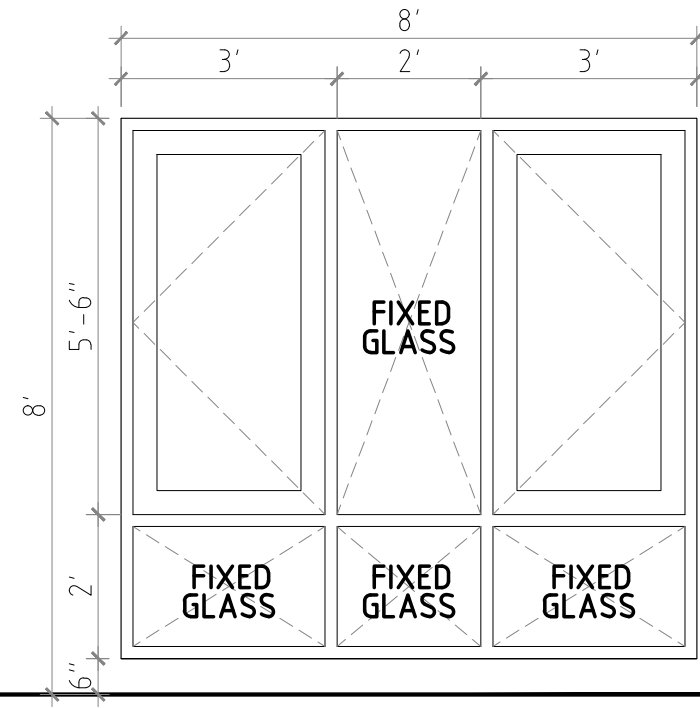
D4 ELEVATION
20 NOS



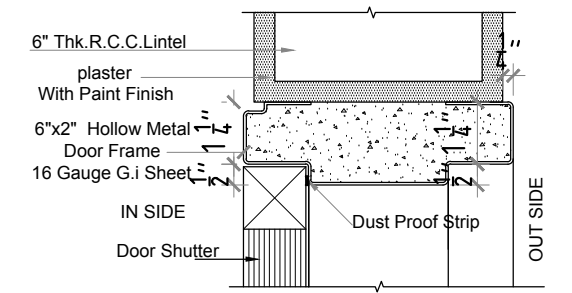
W1 ELEVATION
91 NOS



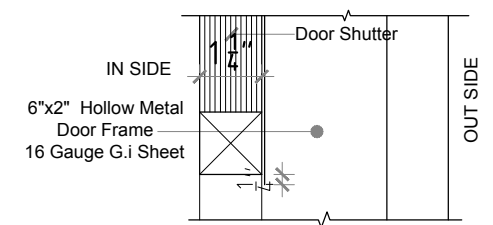
W2 ELEVATION
08 NOS



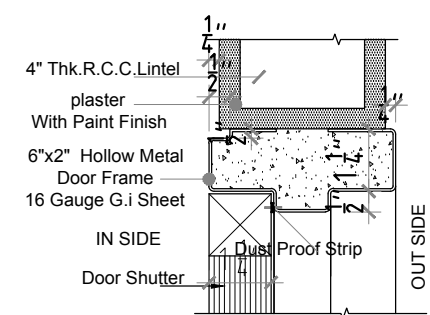
W3 ELEVATION
01 NOS



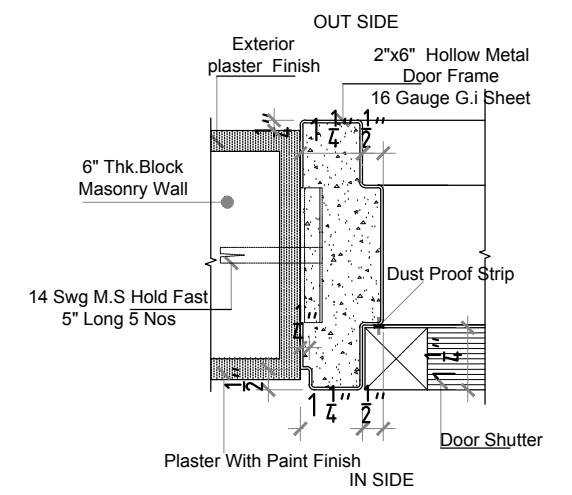
HEAD DETAIL
(9"Thk.Block Wall)



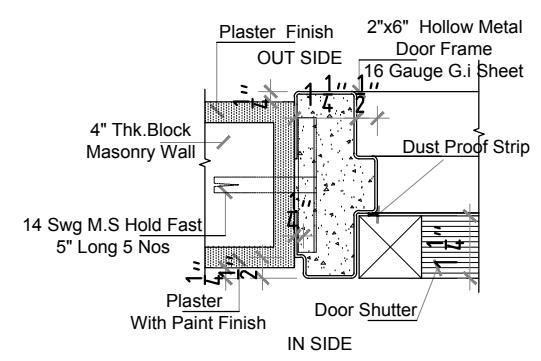
BOTTOM DETAIL



HEAD DETAIL
(4 1/2"Thk.Block Wall)

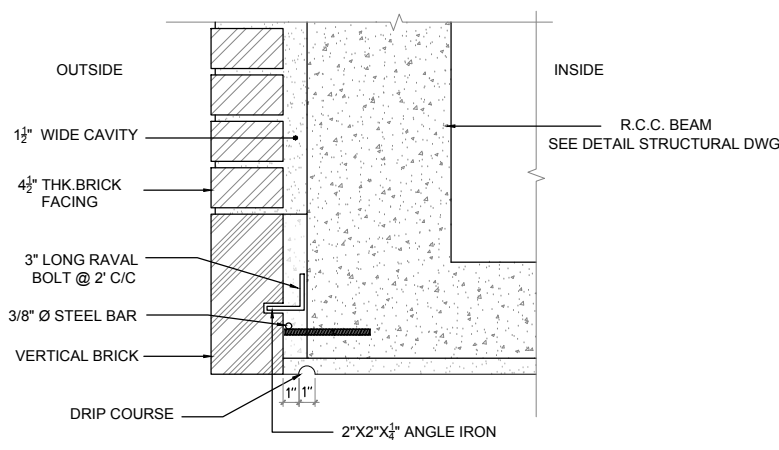


JAMB DETAIL
(9"Thk.Block Wall)

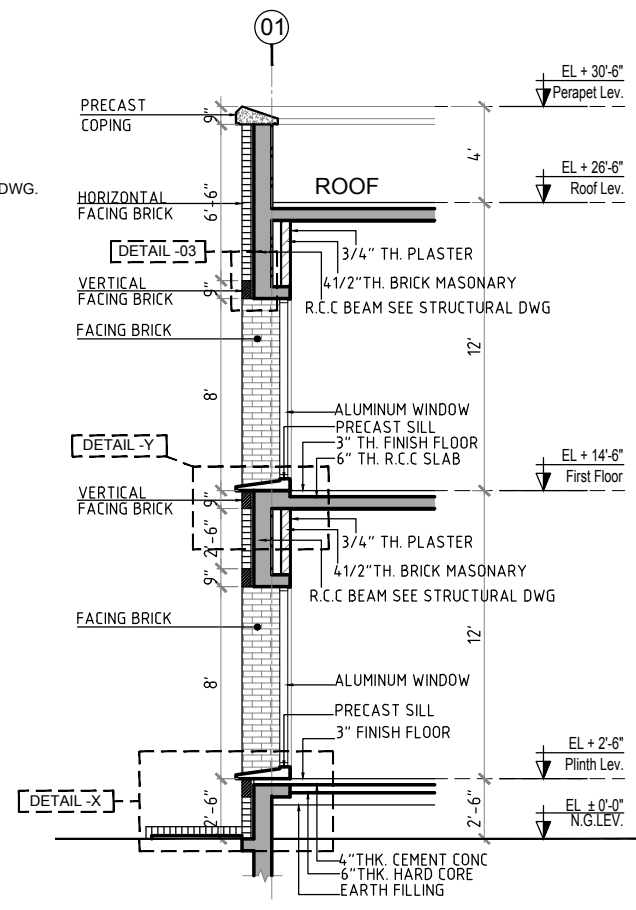


JAMB DETAIL
(4 1/2"Thk.Block Wall)

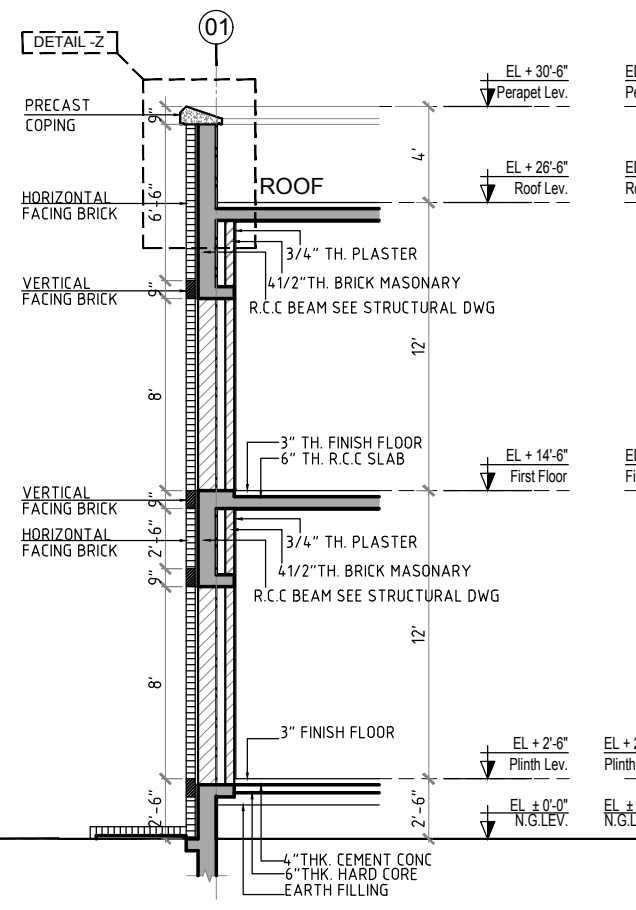
REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
SCHEDULE OF JOINERY		COLLEGE
ARCHITECT :	Scale	
HABIB FIDA ALI Architects 4-C/A, Dhokkhan Road Karachi, Sindh, Pakistan	3/8" = 1'-0"	
STRUCTURE ENGINEER :	Date	
LOYA ASSOCIATES Design & Development Engineering Associates P.O. Box No. 204, Karachi, Sindh, Pakistan Karachi, Sindh, Pakistan	Sep, 2021	
ELECTRICAL CONSULTANT:	Drawn	
MEHROZ	Checked	
ASIF USMANI	Drawing No	
PLUMBING CONSULTANT :	A-07	
N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS		



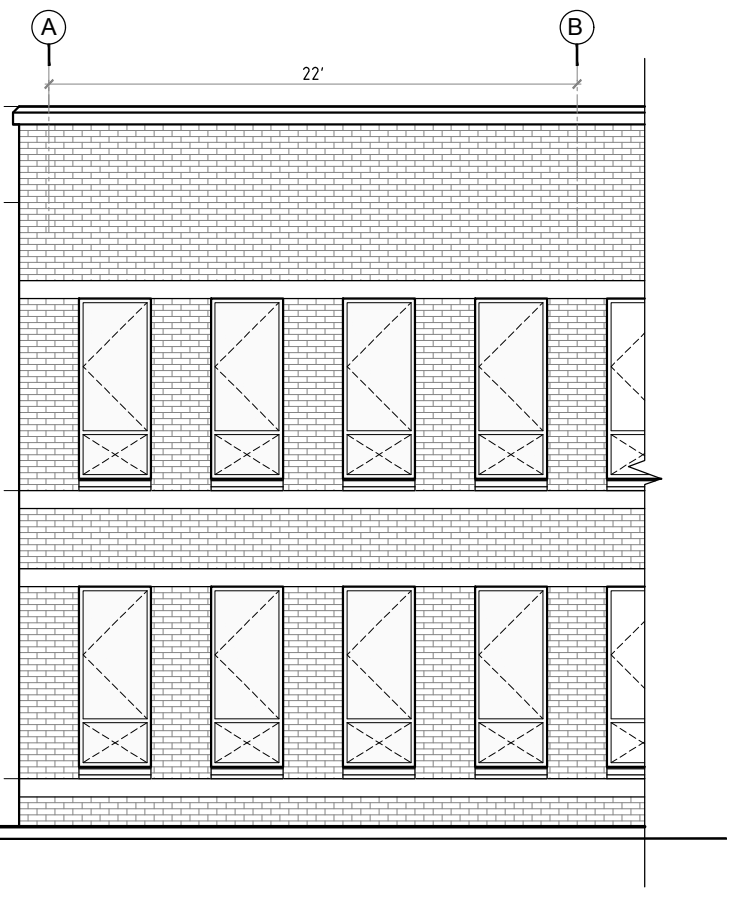
DETAIL - 3
SECTION AT EDGE (VERTICAL) BRICK FIXING DETAIL
SCALE : 3" = 1'-0"



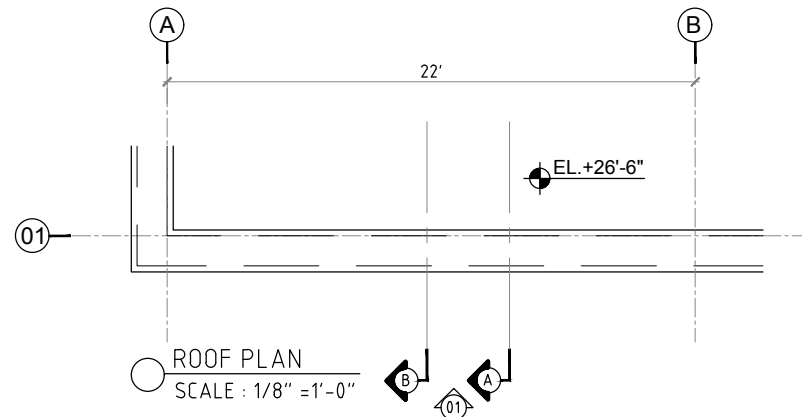
SECTION A-A
SCALE : 1/8" = 1'-0"



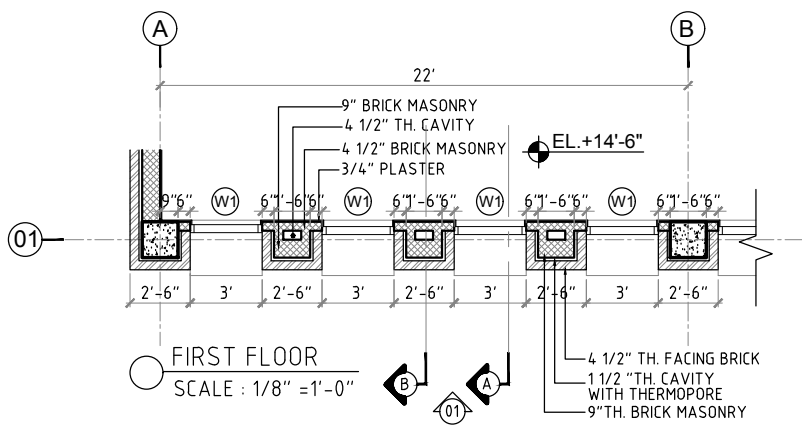
SECTION B-B
SCALE : 1/8" = 1'-0"



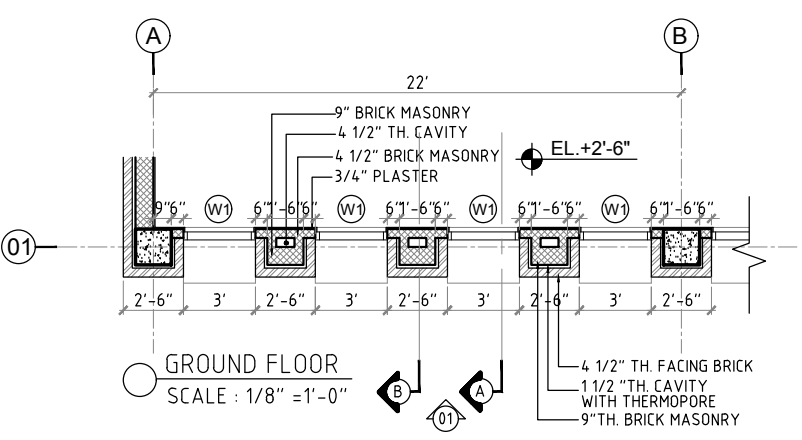
ELEVATION -01
SCALE : 1/8" = 1'-0"



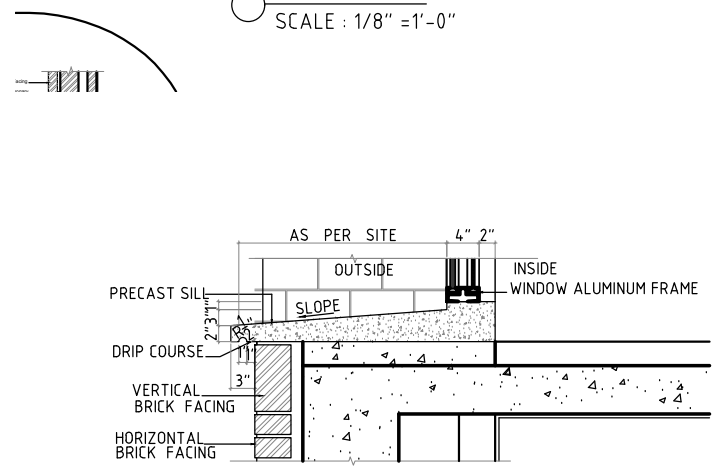
ROOF PLAN
SCALE : 1/8" = 1'-0"



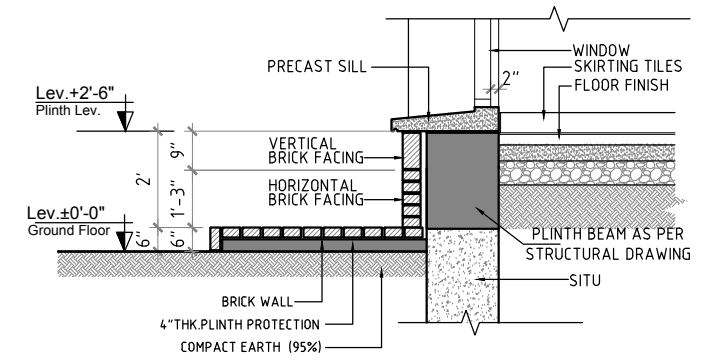
FIRST FLOOR
SCALE : 1/8" = 1'-0"



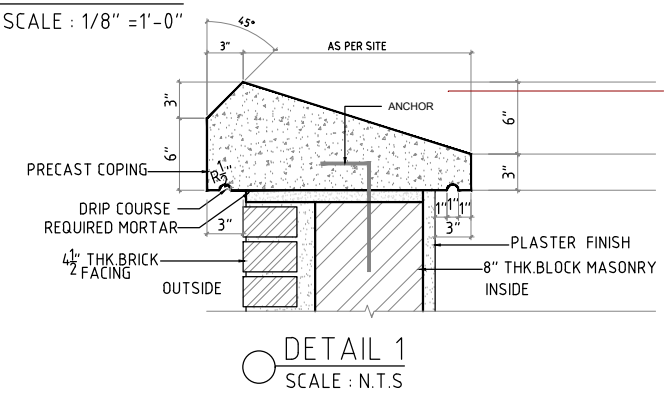
GROUND FLOOR
SCALE : 1/8" = 1'-0"



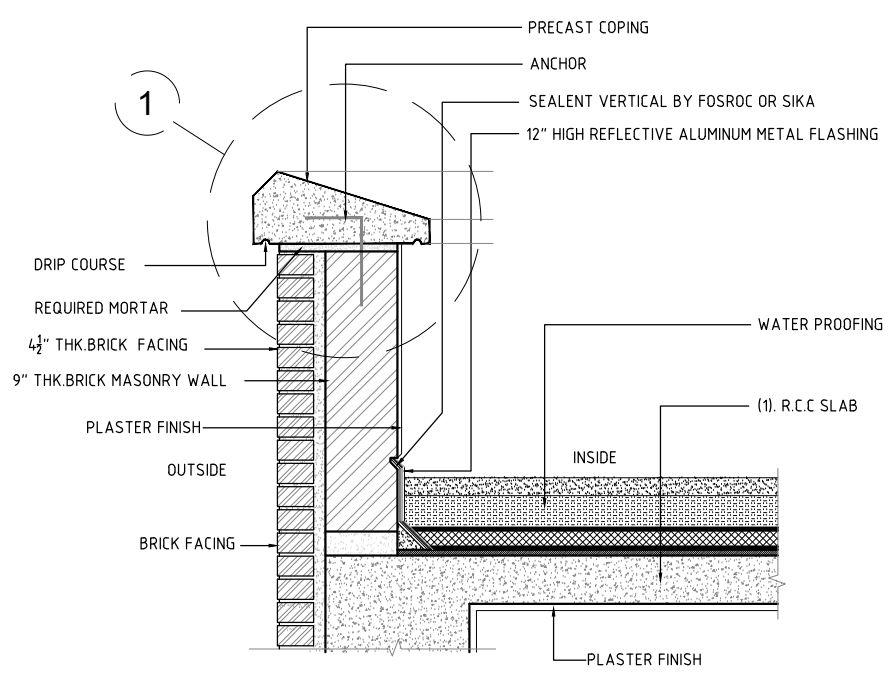
DETAIL Y
SCALE : 1/2" = 1'-0"



DETAIL X
SCALE : 1/4" = 1'-0"

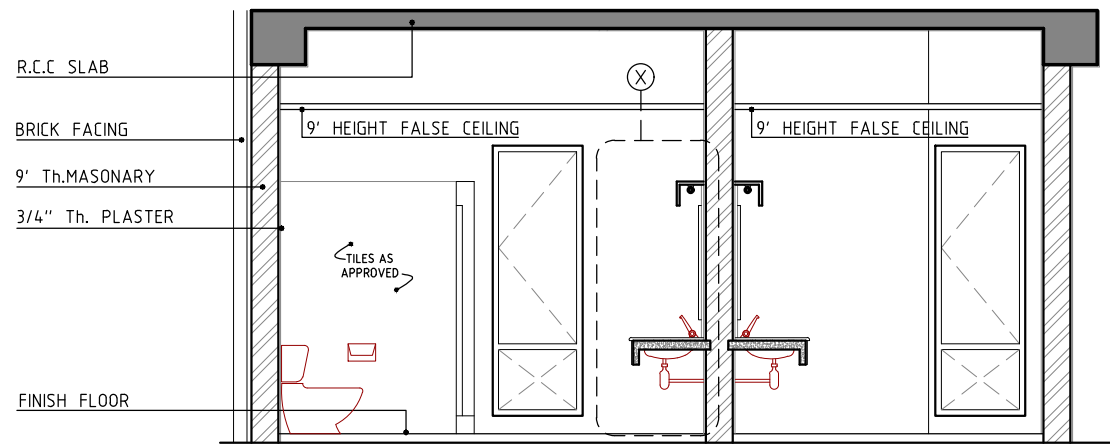


DETAIL 1
SCALE : N.T.S

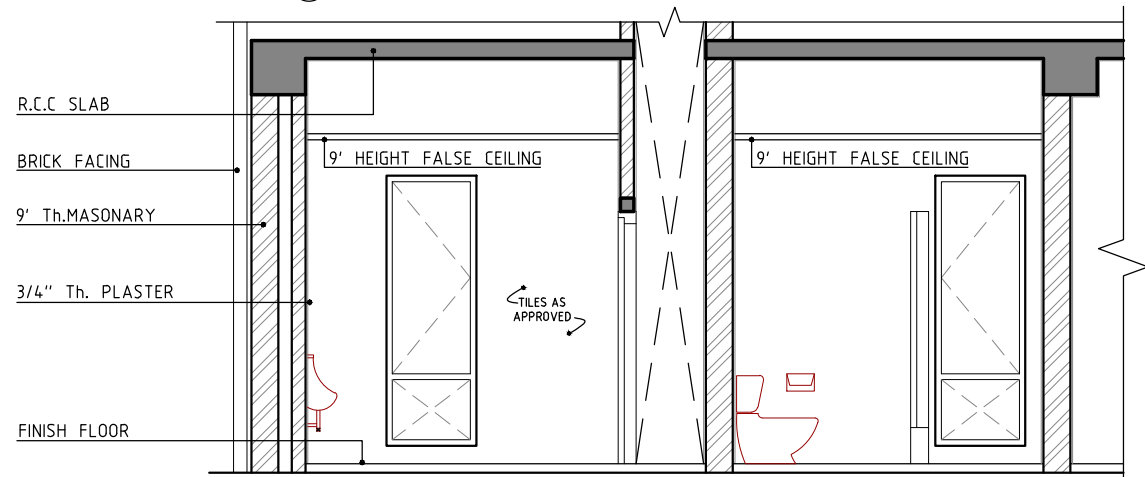


DETAIL Z
SCALE : 3/8" = 1'-0"

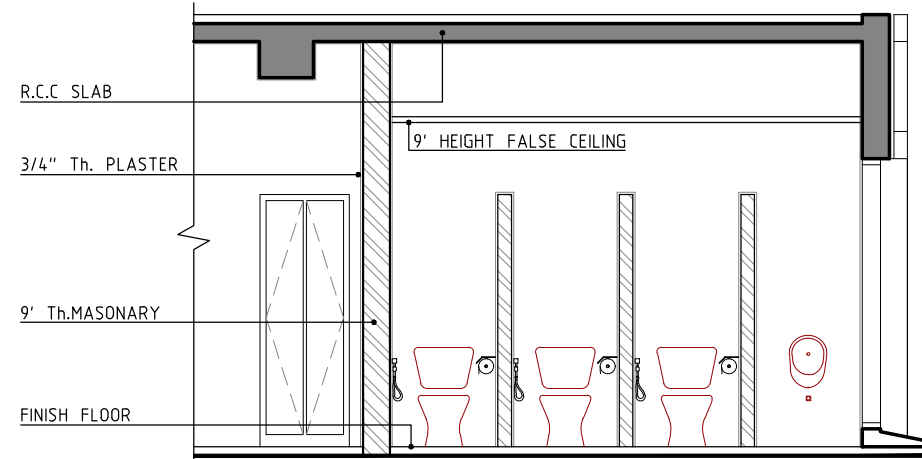
REV.	DATE		
Issued For			
FOR TENDER			
SIBA COMMUNITY COLLEGE (JACOBABAD)			
DRAWING TITLE		COMMUNITY COLLEGE	
WALL DETAIL			
ARCHITECT :	HABIB FIDA ALI	Scale	3/32" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES	Date	Sep, 2021
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates	Drawn	MEHROZ
PLUMBING CONSULTANT :	N.A. ASSOCIATES	Checked	ASIF USMANI
Drawing No			A-08



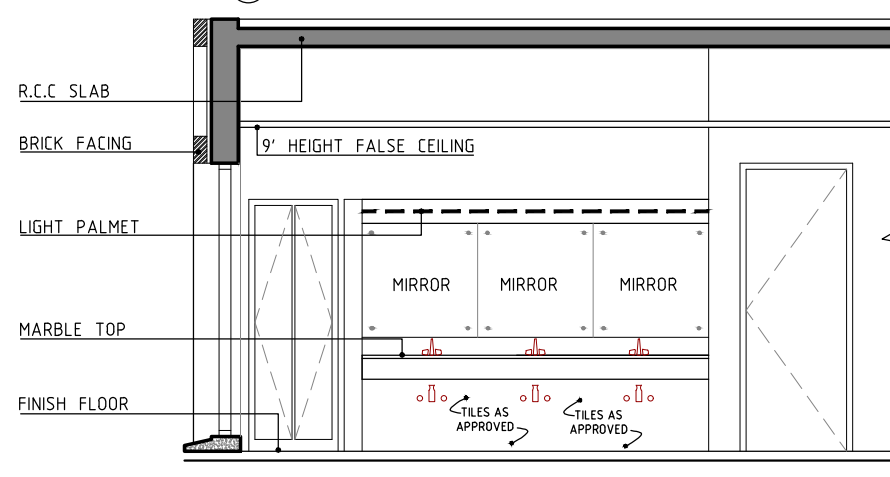
SECTION A-A



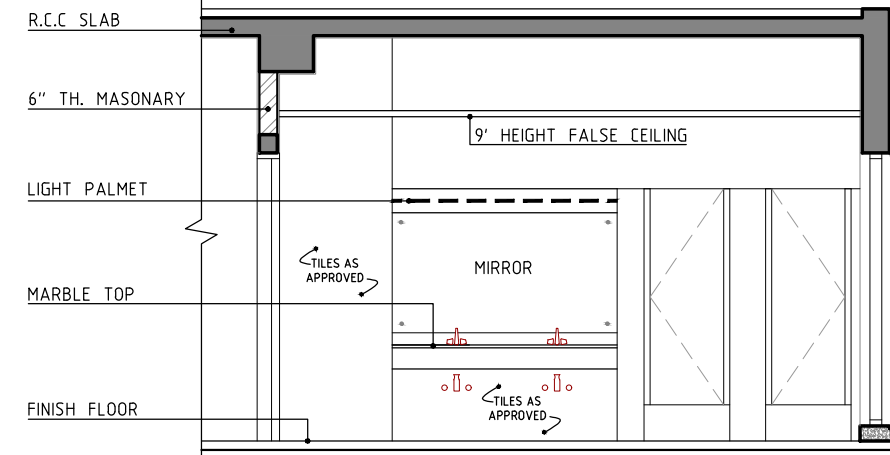
SECTION C-C



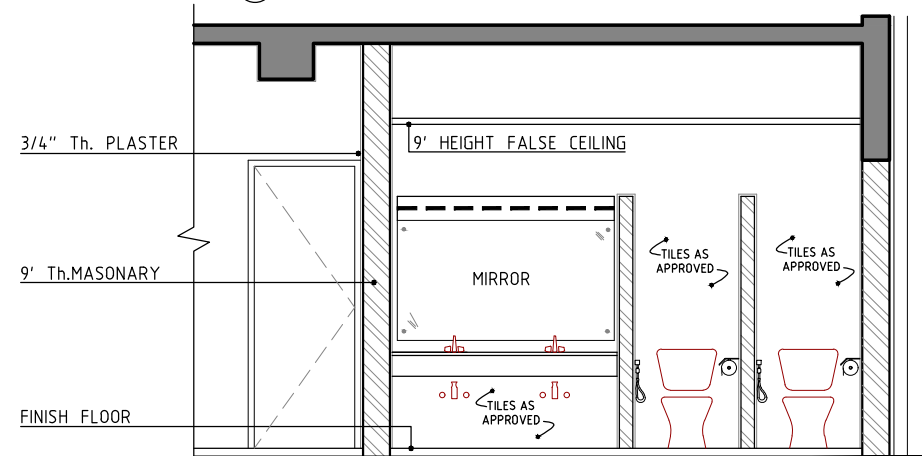
SECTION B-B



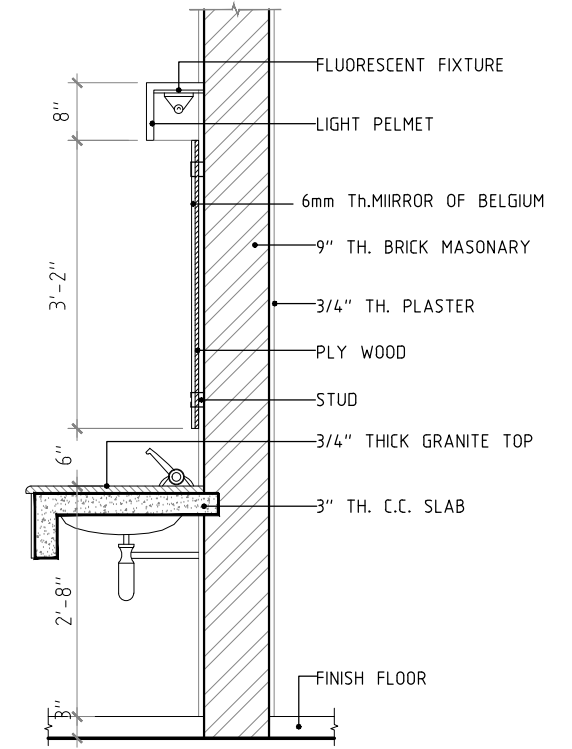
SECTION D-D



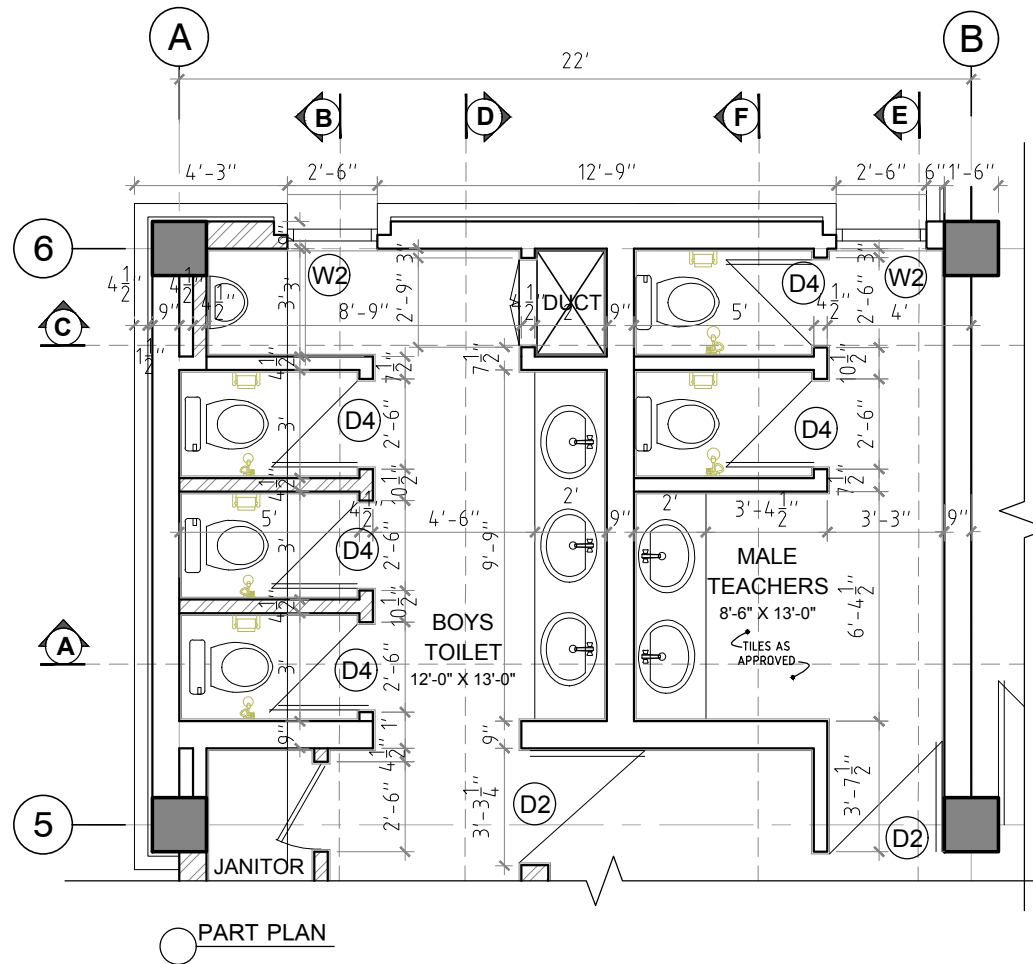
SECTION E-E



SECTION F-F

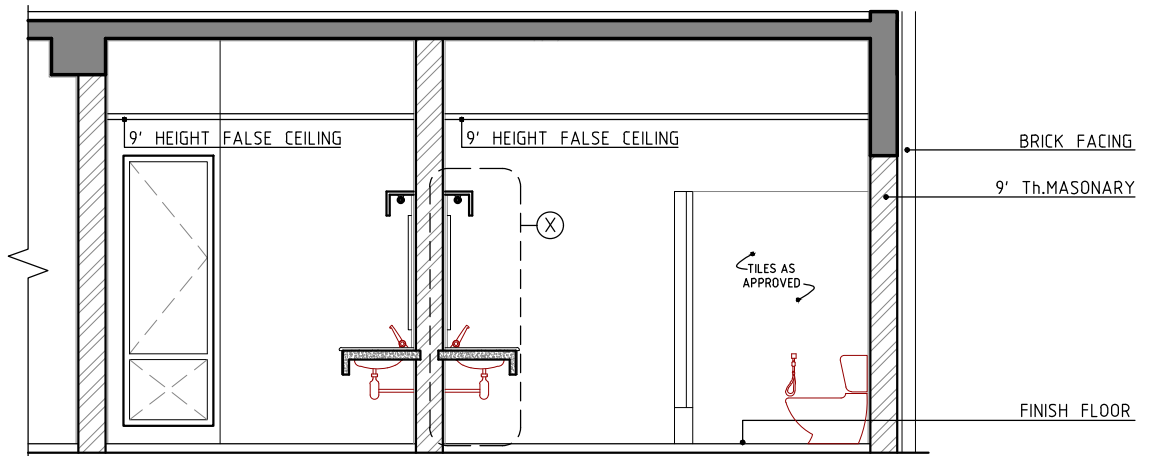


DETAIL - X

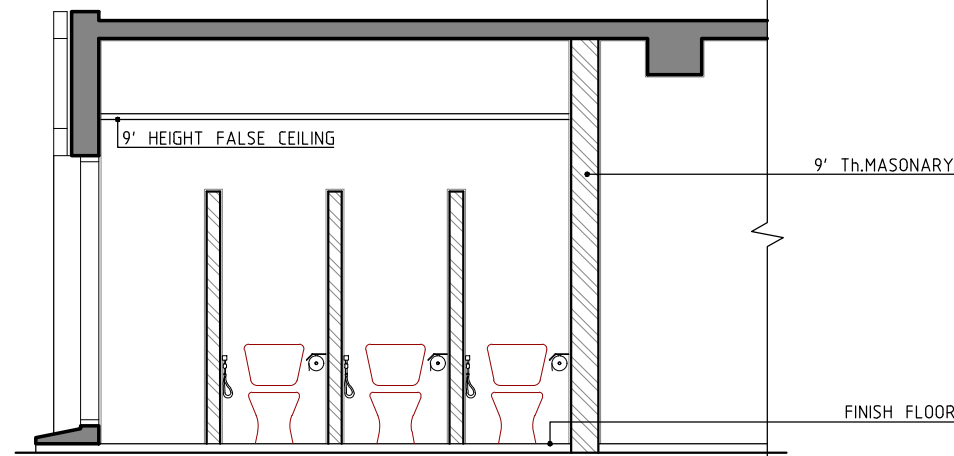


PART PLAN

REV.	DATE	
Issued For FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
MALE TOILET DETAIL GROUND FLOOR		
ARCHITECT:	HABIB FIDA ALI	Scale 3/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn DANİYAL
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-09



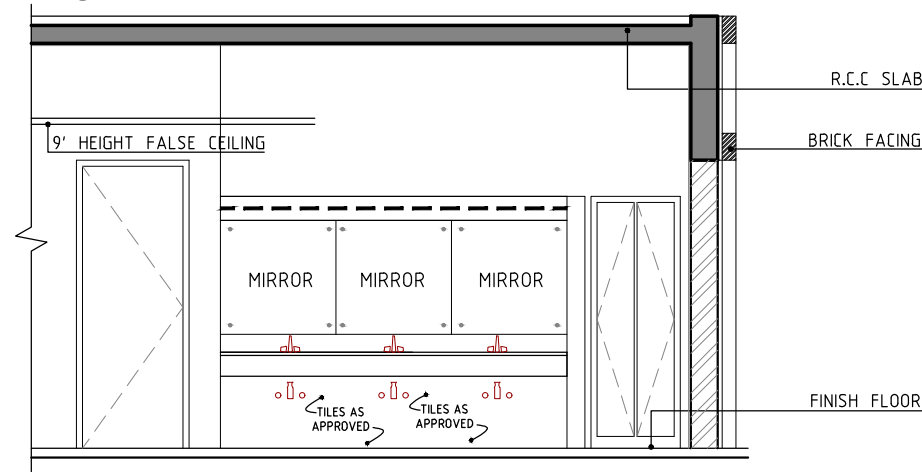
SECTION A-A



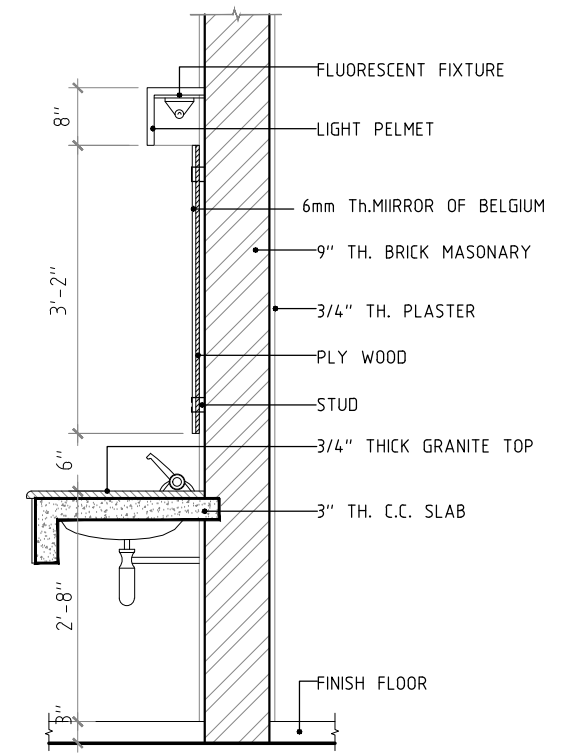
SECTION B-B



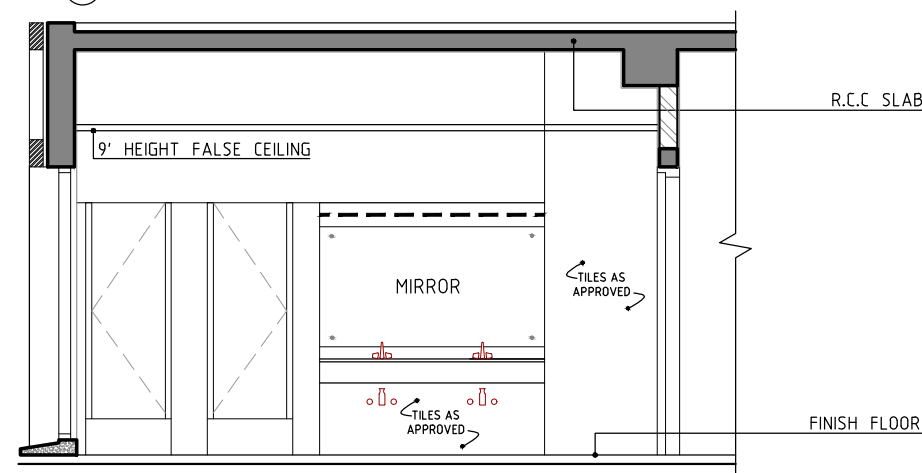
SECTION C-C



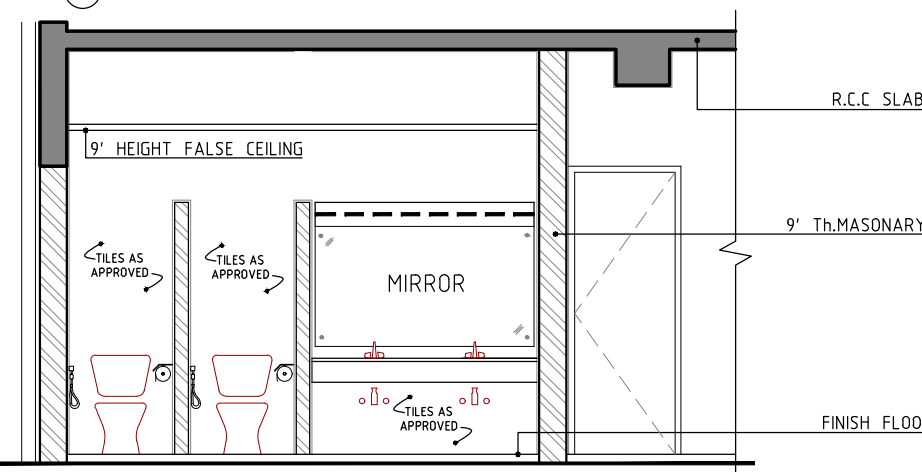
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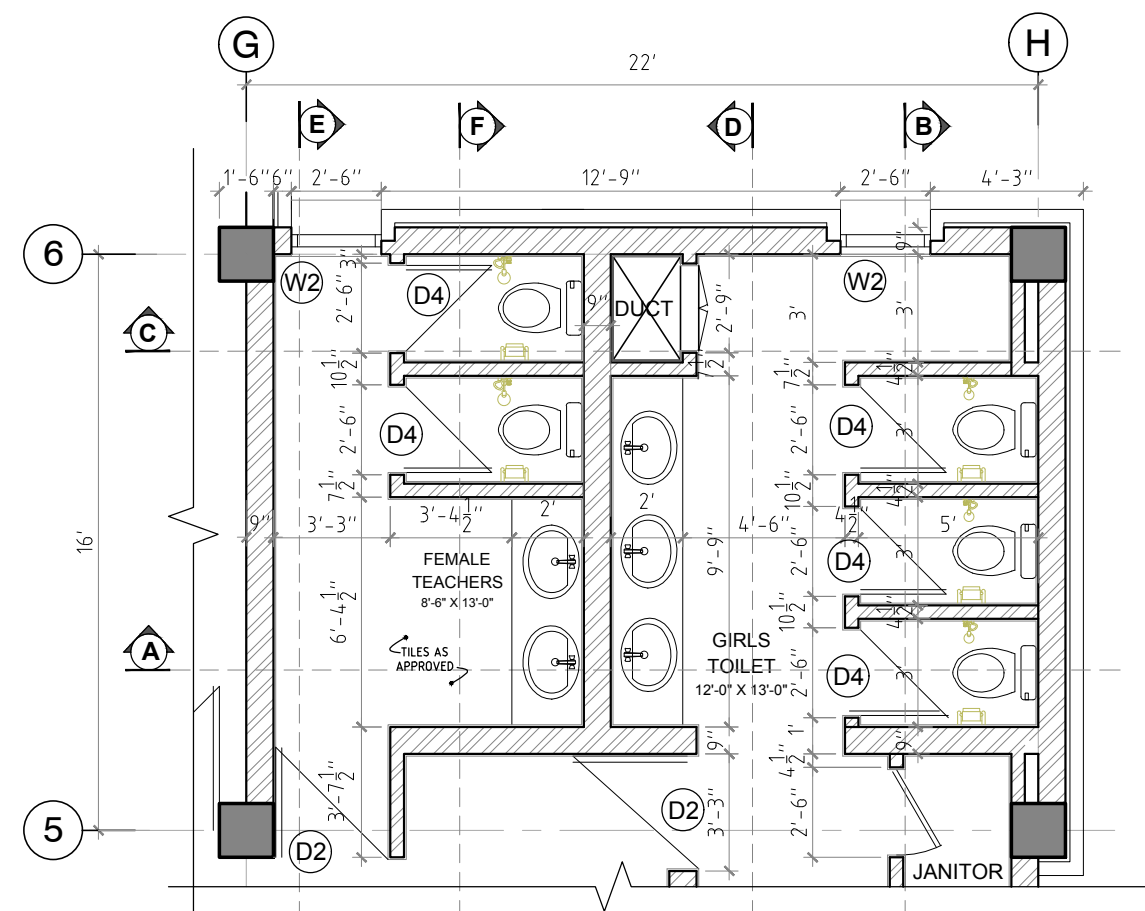
DETAIL - X



SECTION E-E

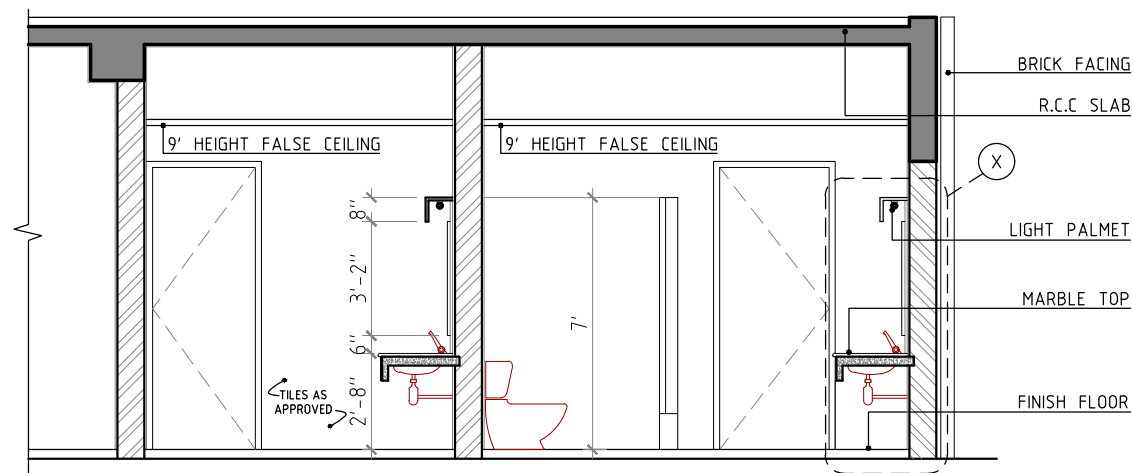


SECTION F-F

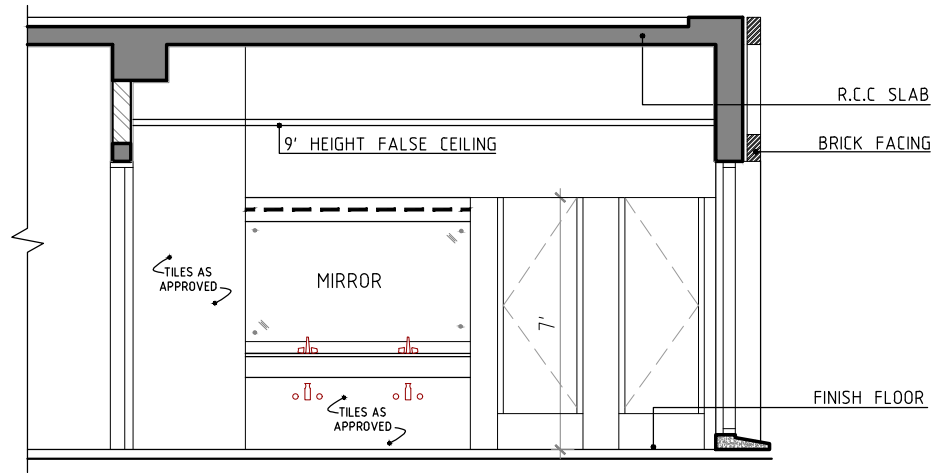


PART PLAN

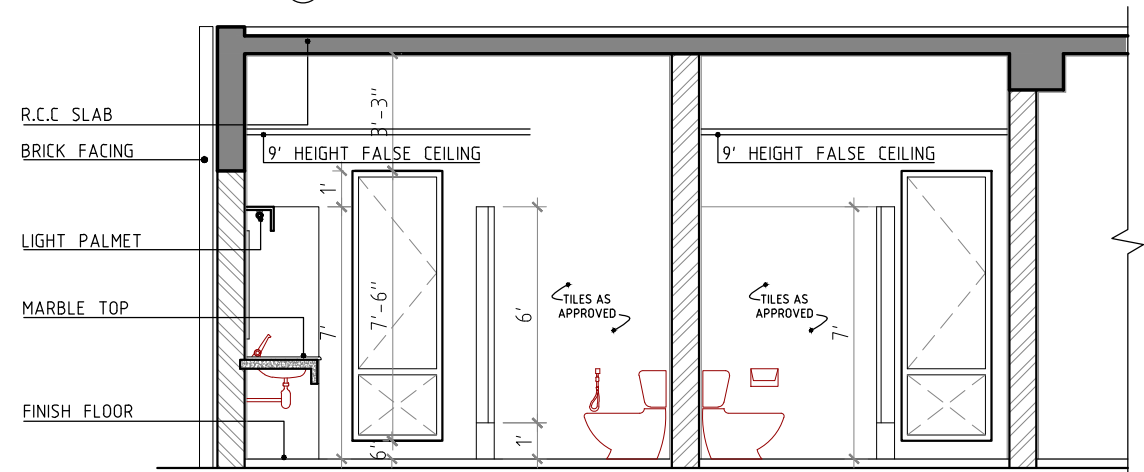
REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
FEMALE TOILET DETAIL GROUND FLOOR		
ARCHITECT:	HABIB FIDA ALI Architects	Scale 3/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn DANİYAL
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-10



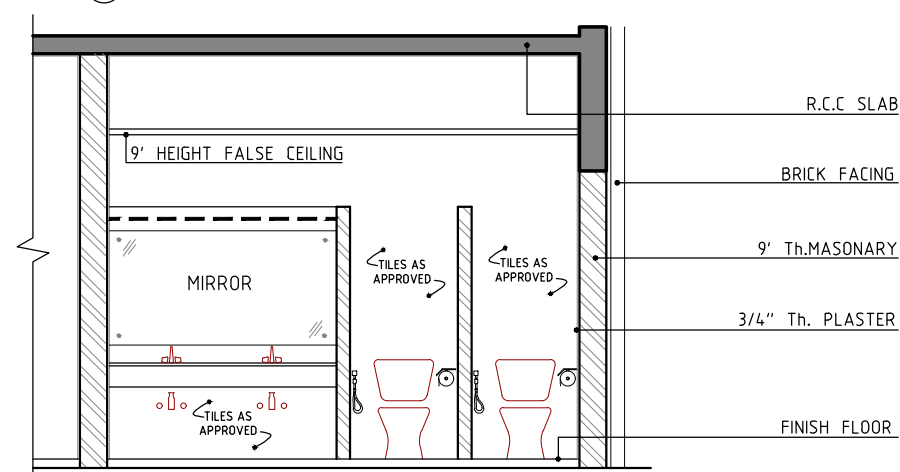
SECTION A-A



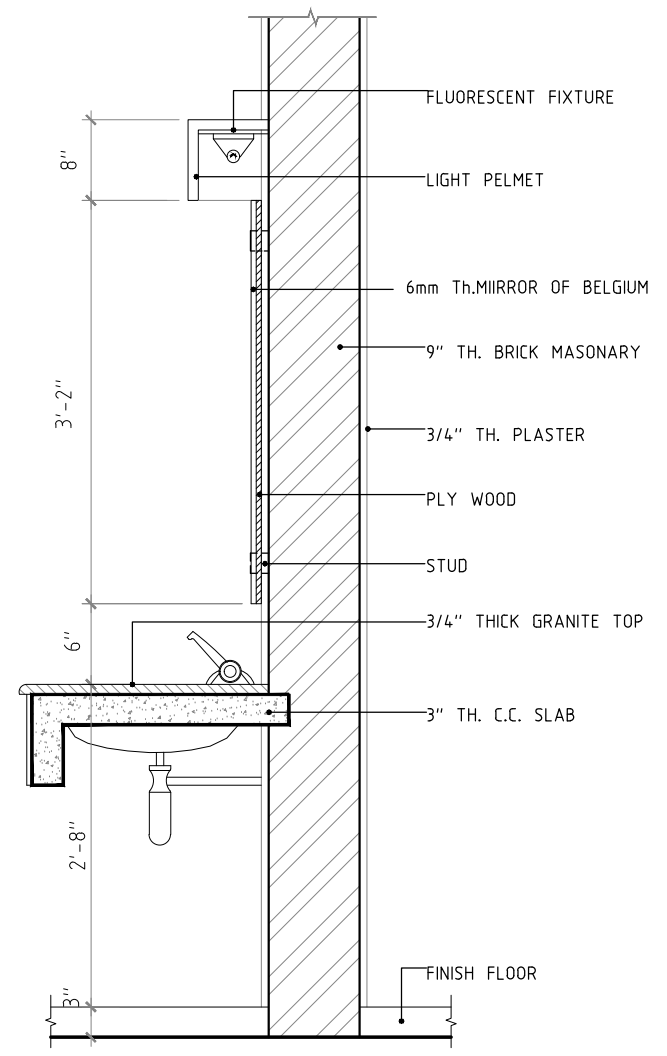
SECTION B-B



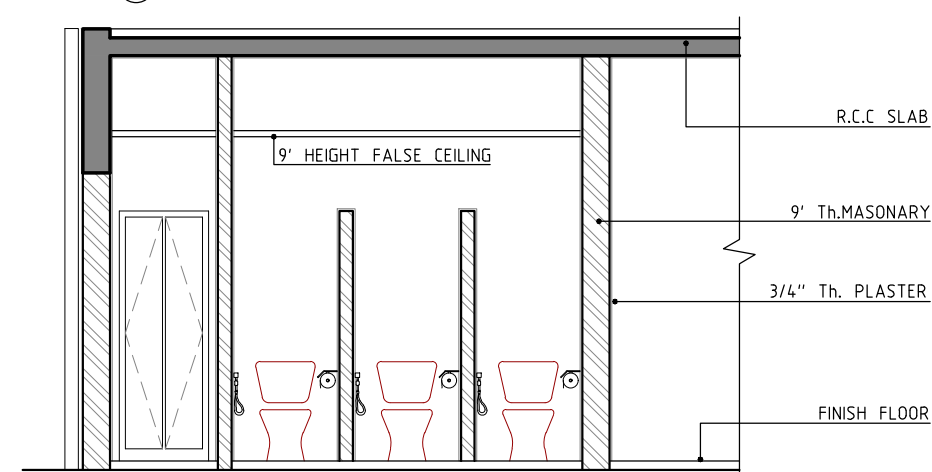
SECTION C-C



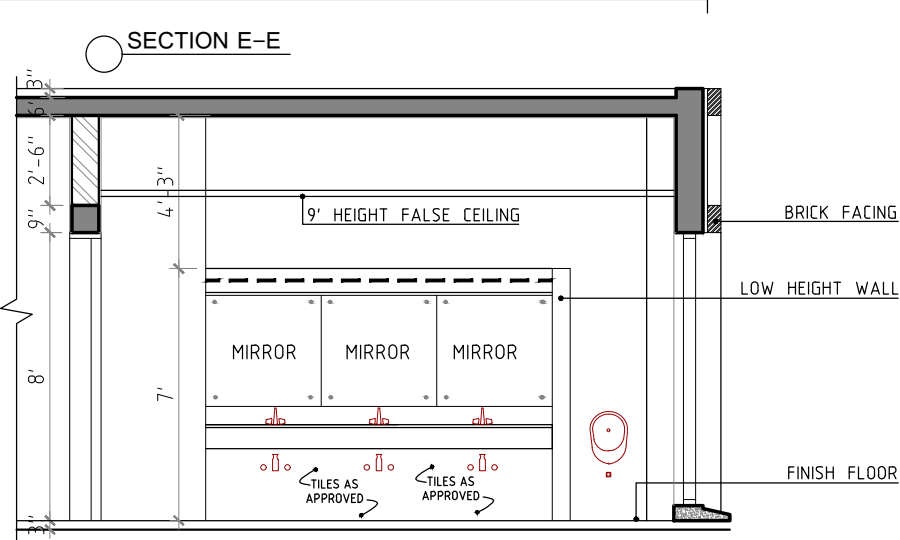
SECTION D-D



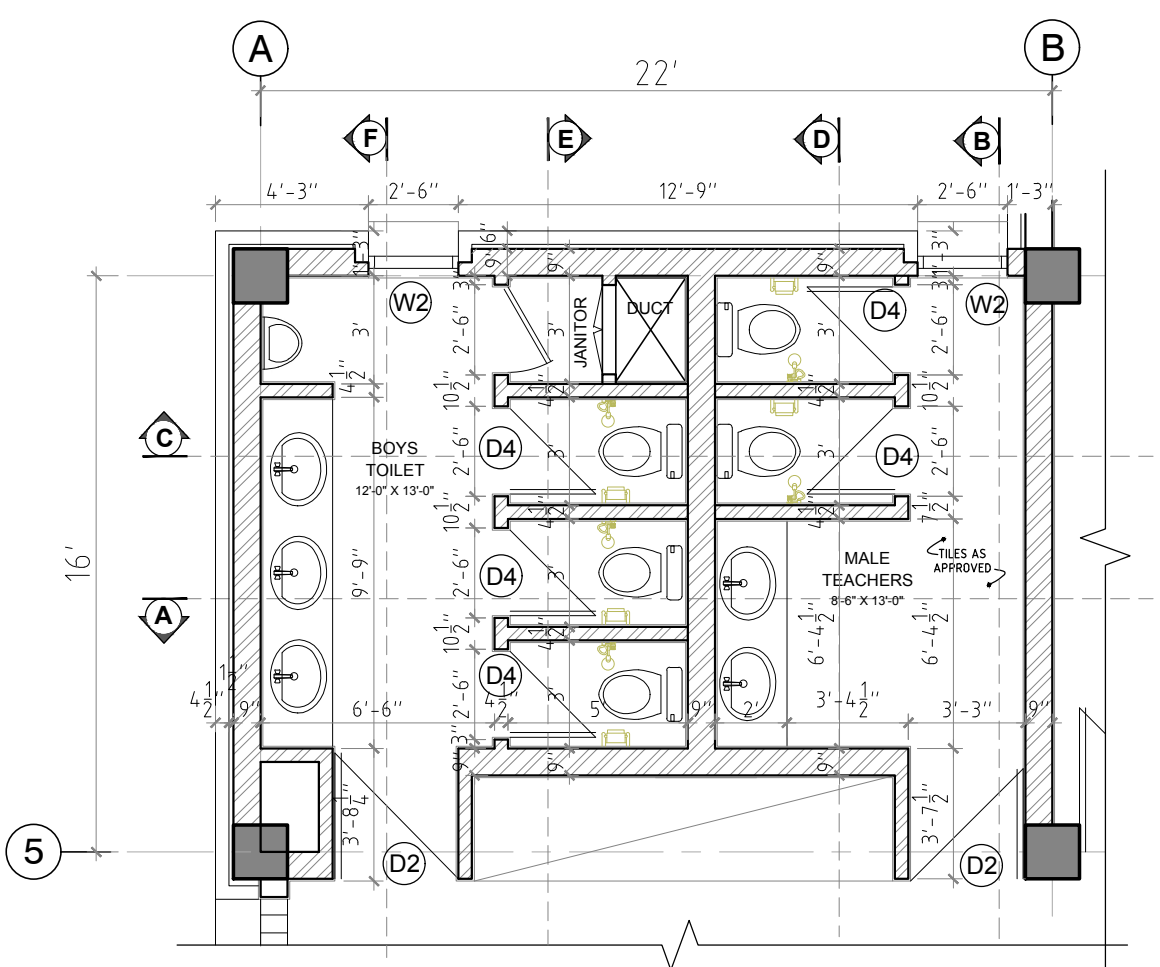
DETAIL - X



SECTION E-E

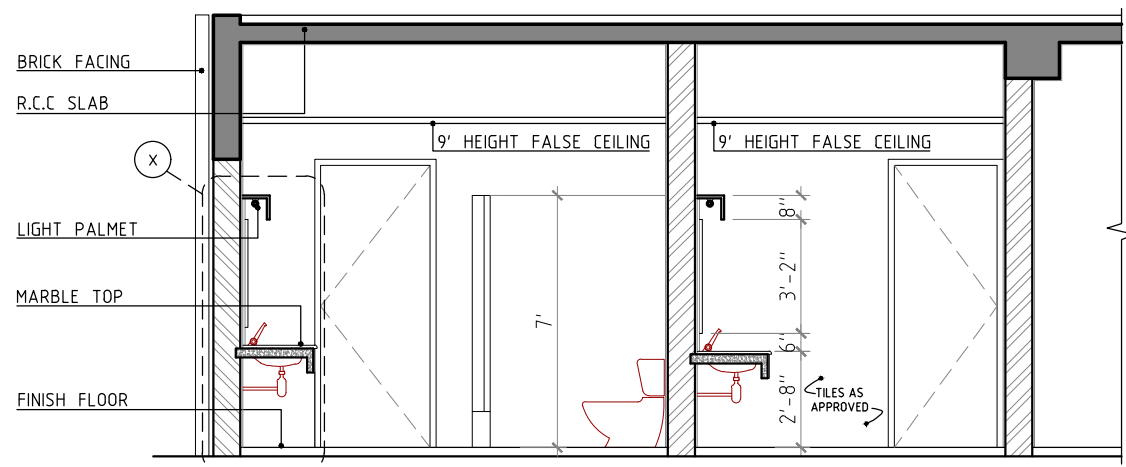


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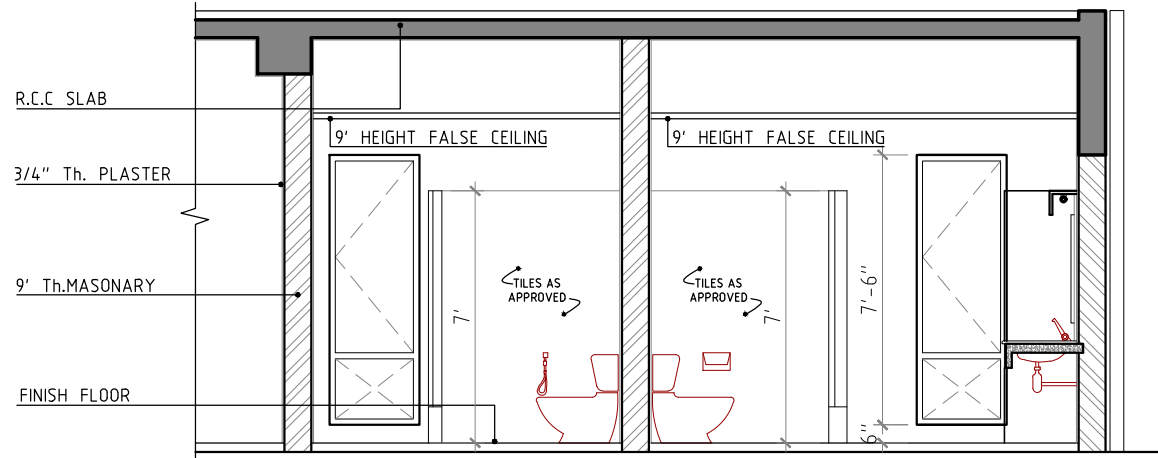


PART PLAN

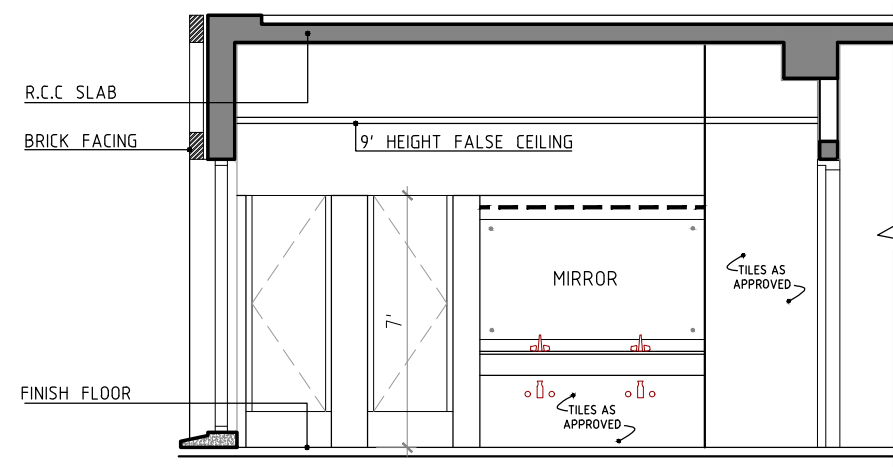
REV.	DATE	
Issued For FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
MALE TOILET DETAIL FIRST FLOOR		
ARCHITECT:	HABIB FIDA ALI	Scale 3/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn DANİYAL
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-11



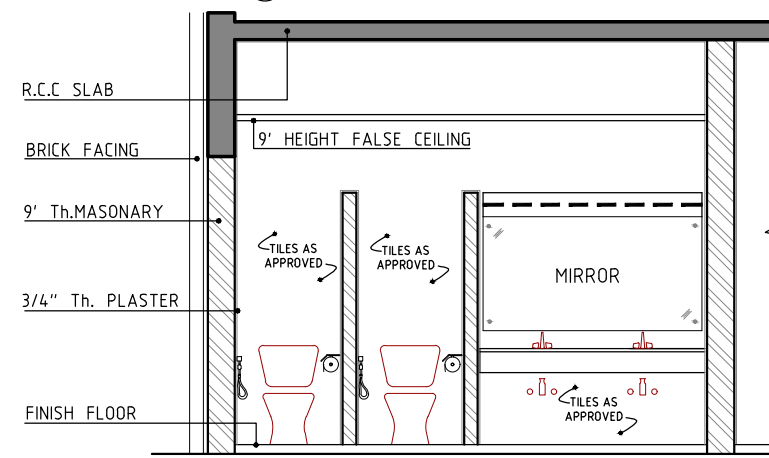
SECTION A-A



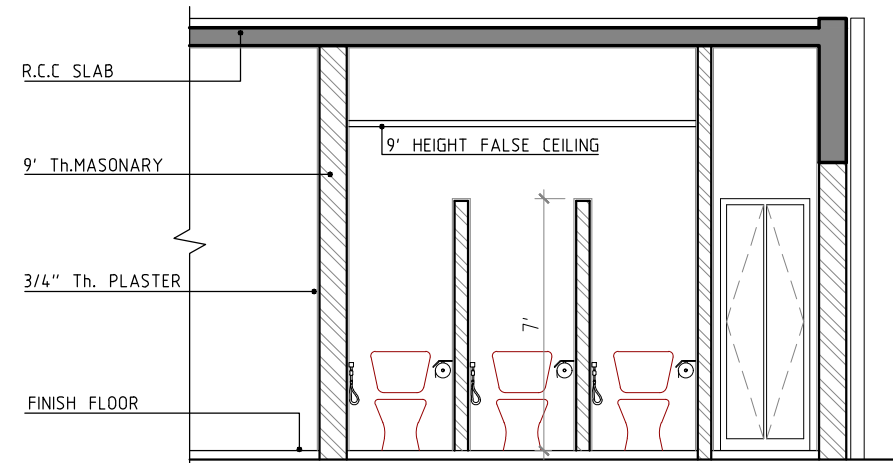
SECTION C-C



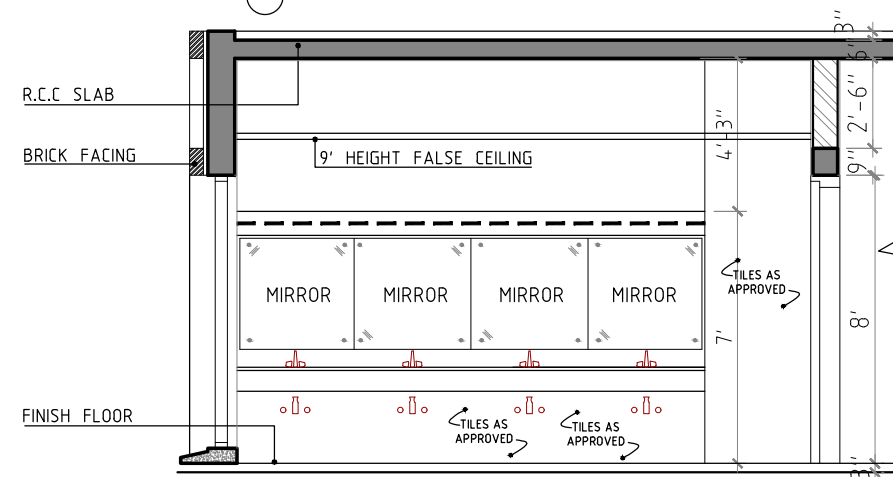
SECTION B-B



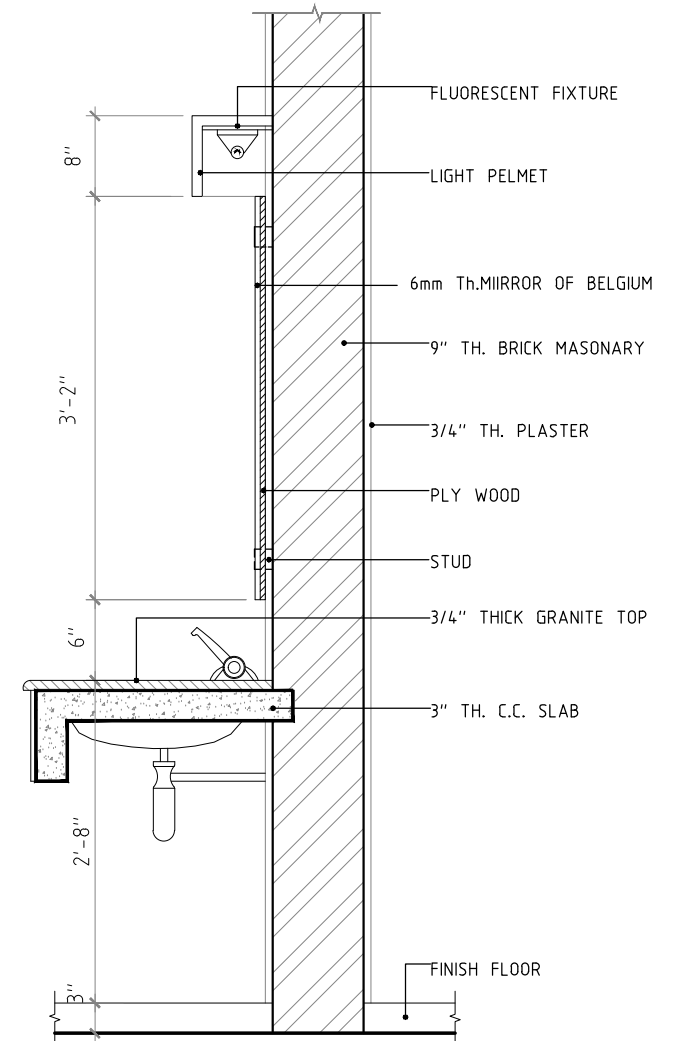
SECTION D-D



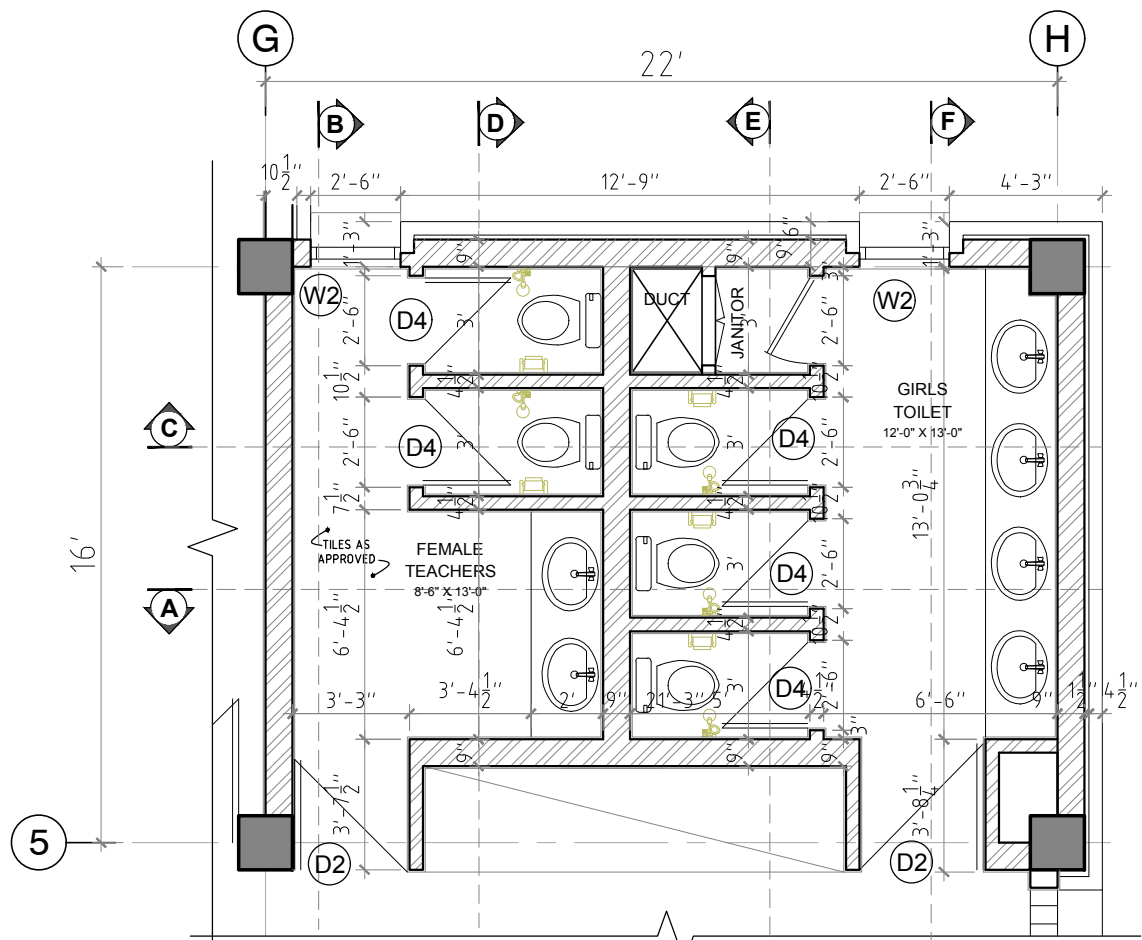
SECTION E-E



SECTION F-F

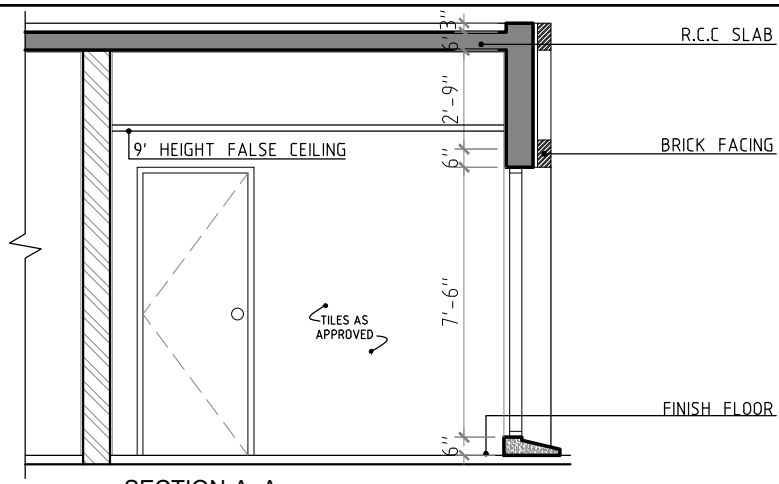


DETAIL - X

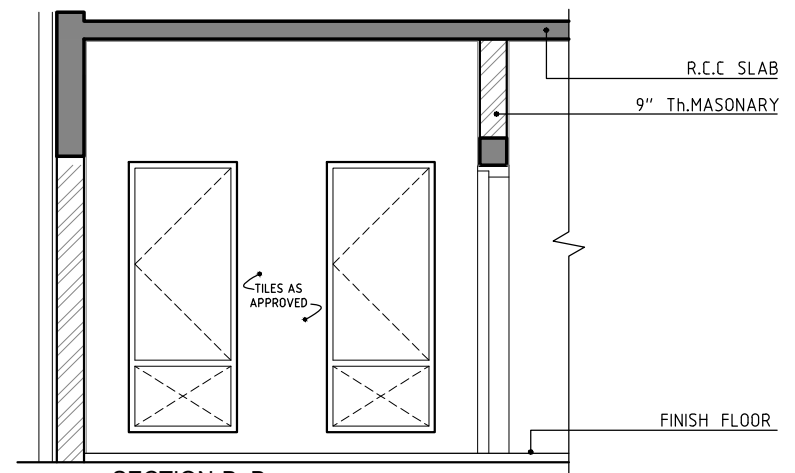


PART PLAN

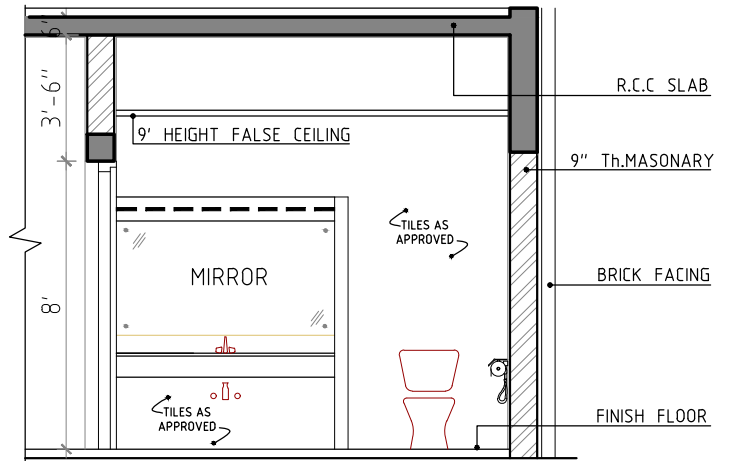
REV.	DATE		
Issued For FOR TENDER			
SIBA COMMUNITY COLLEGE (JACOBABAD)			
DRAWING TITLE		COMMUNITY COLLEGE	
FEMALE TOILET DETAIL FIRST FLOOR			
ARCHITECT:	HABIB FIDA ALI	Scale	3/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date	Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn	DANIYAL
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked	ASIF USMANI
		Drawing No	A-12



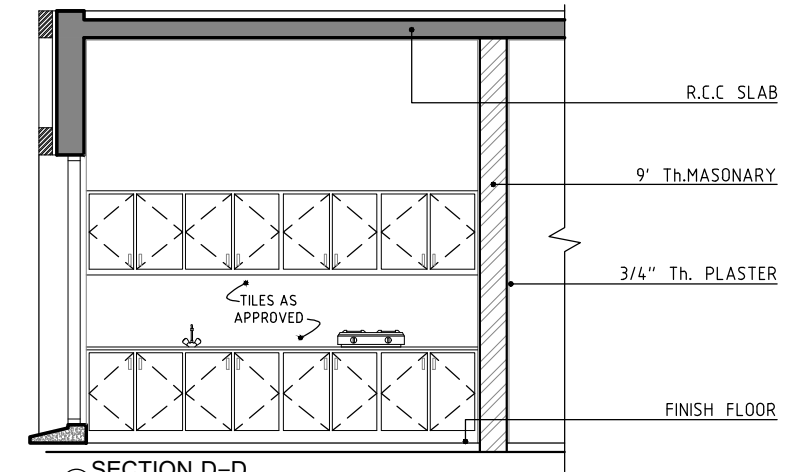
SECTION A-A



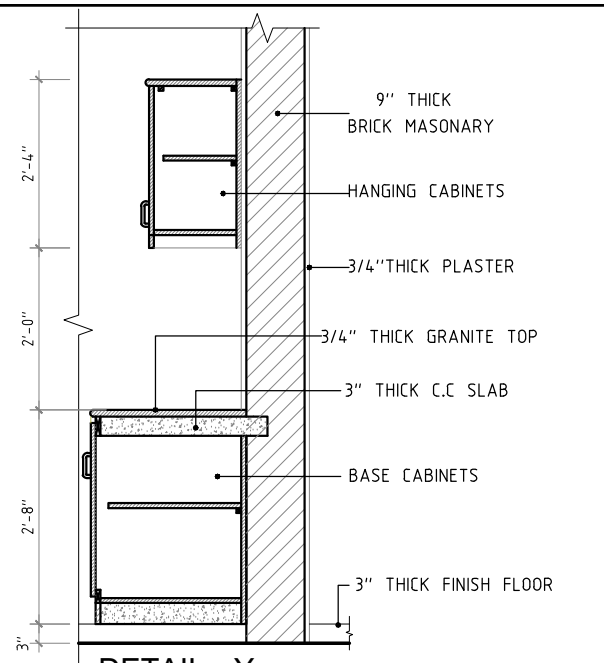
SECTION B-B



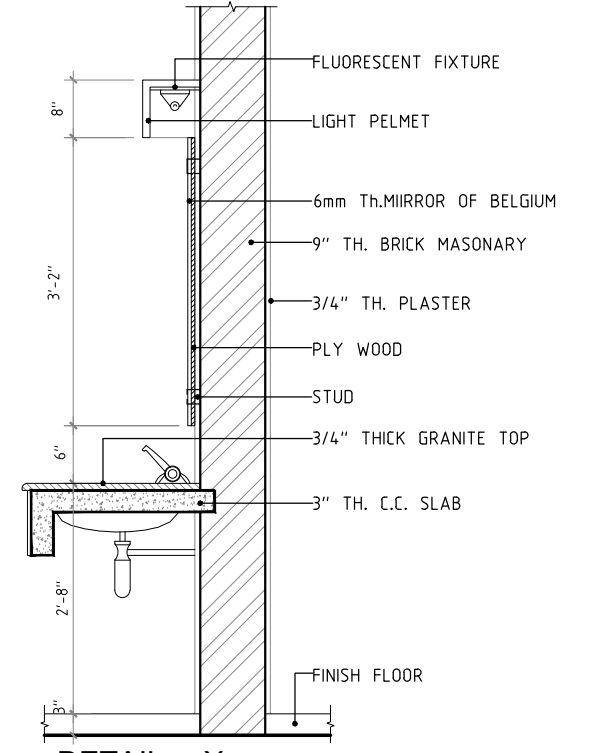
SECTION C-C



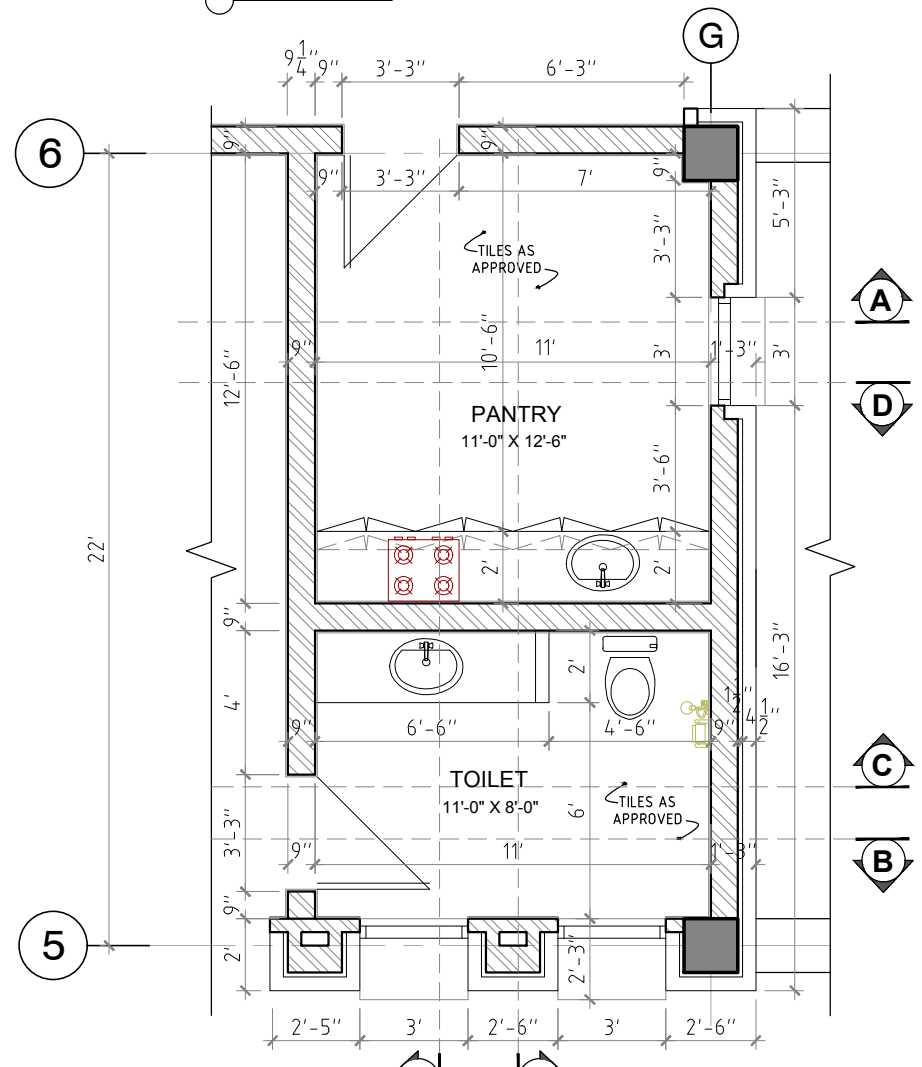
SECTION D-D



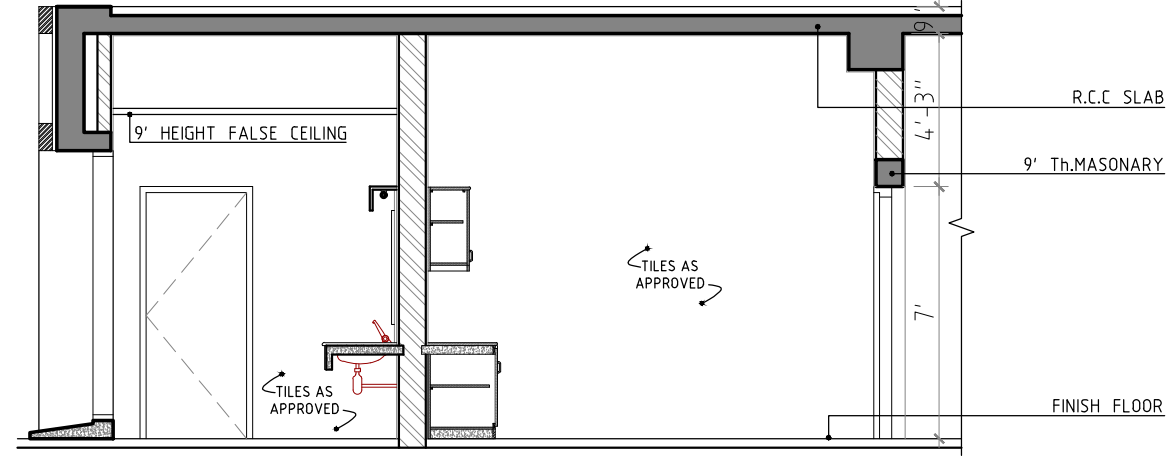
DETAIL -Y



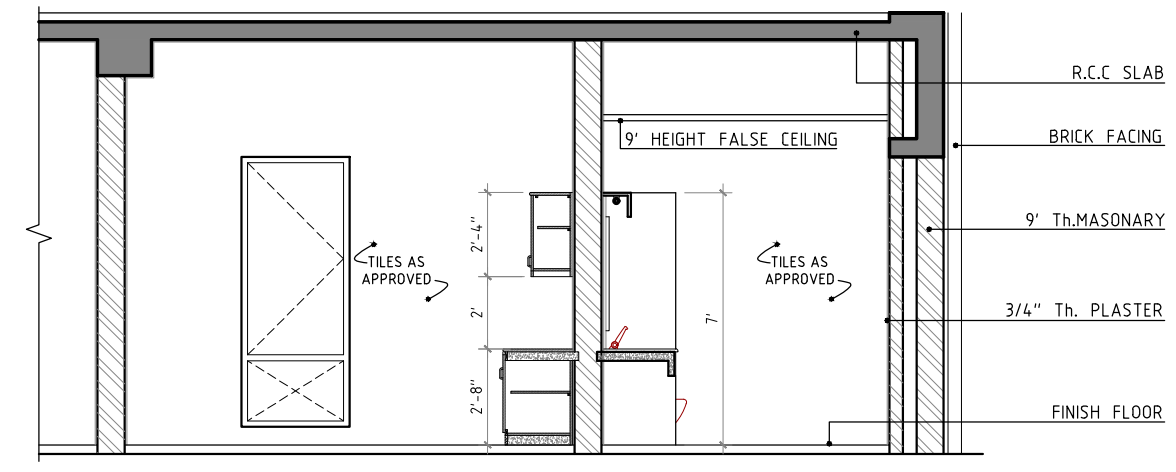
DETAIL -X



PLAN

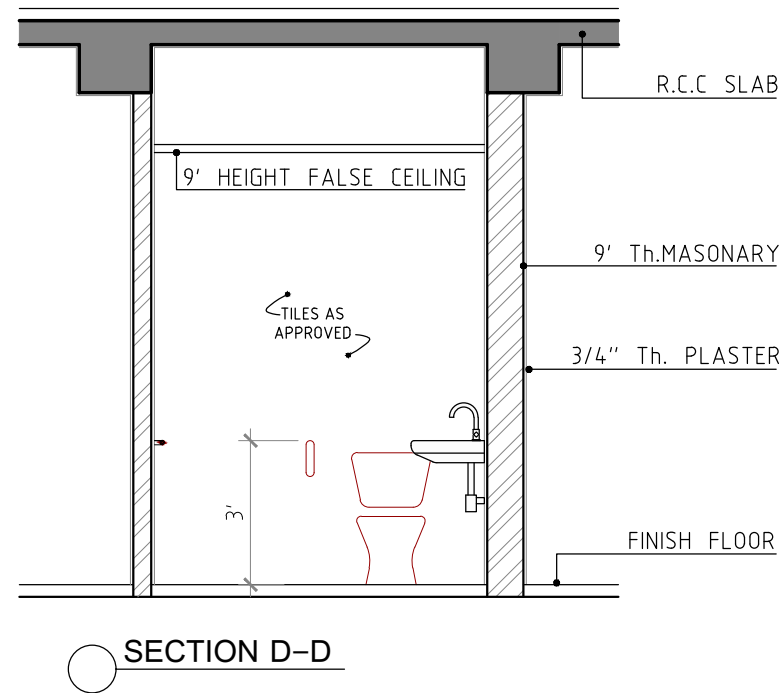
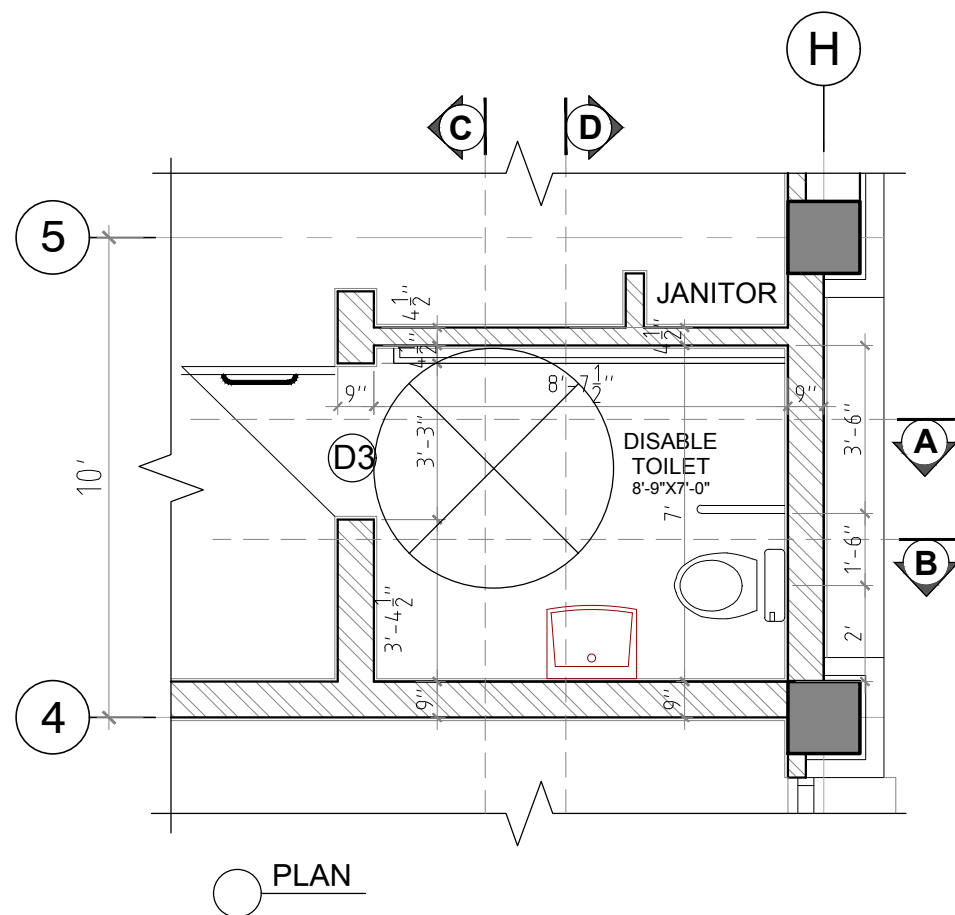
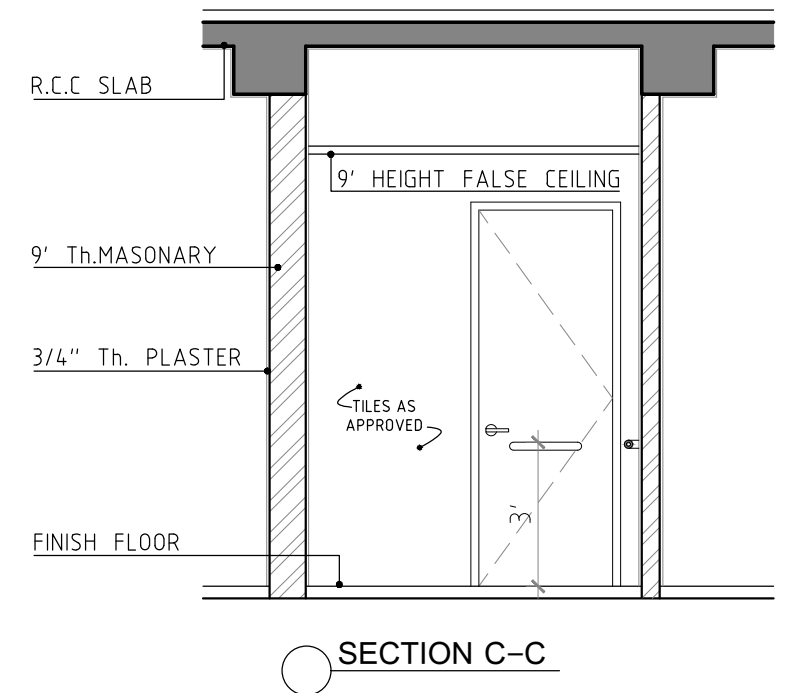
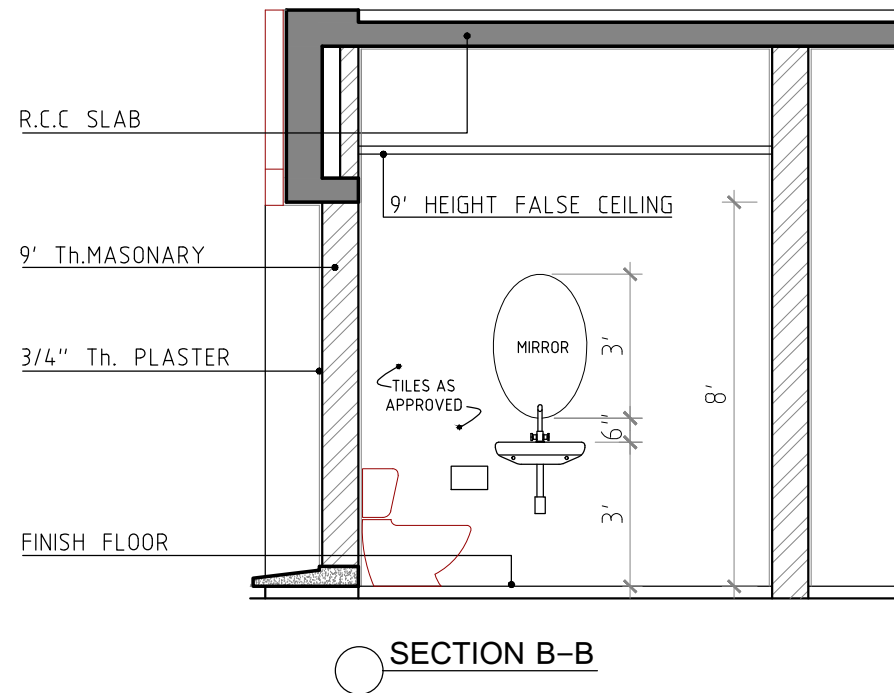
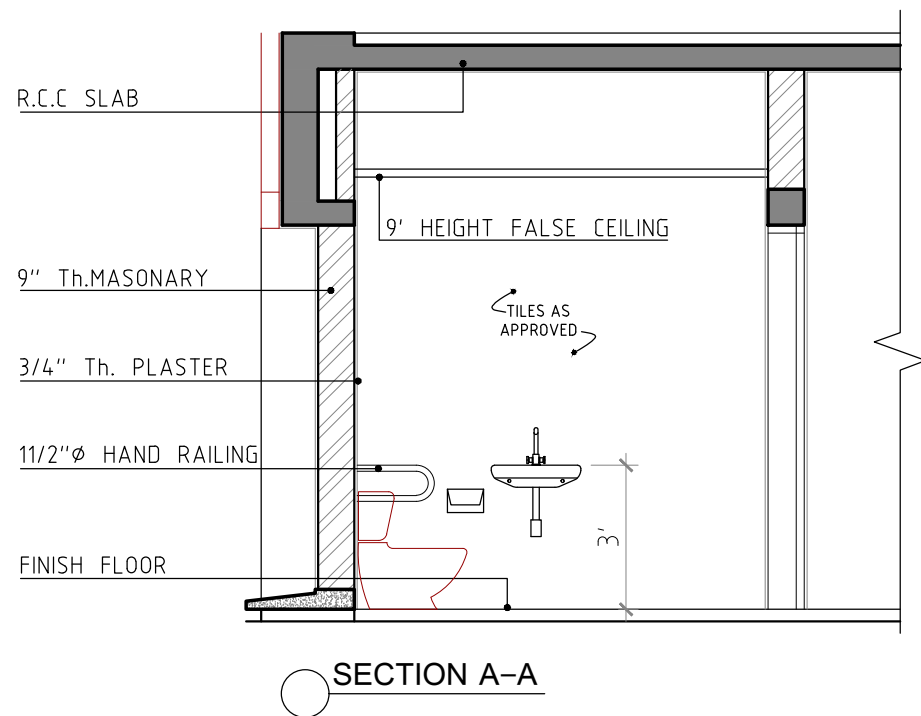


SECTION E-E

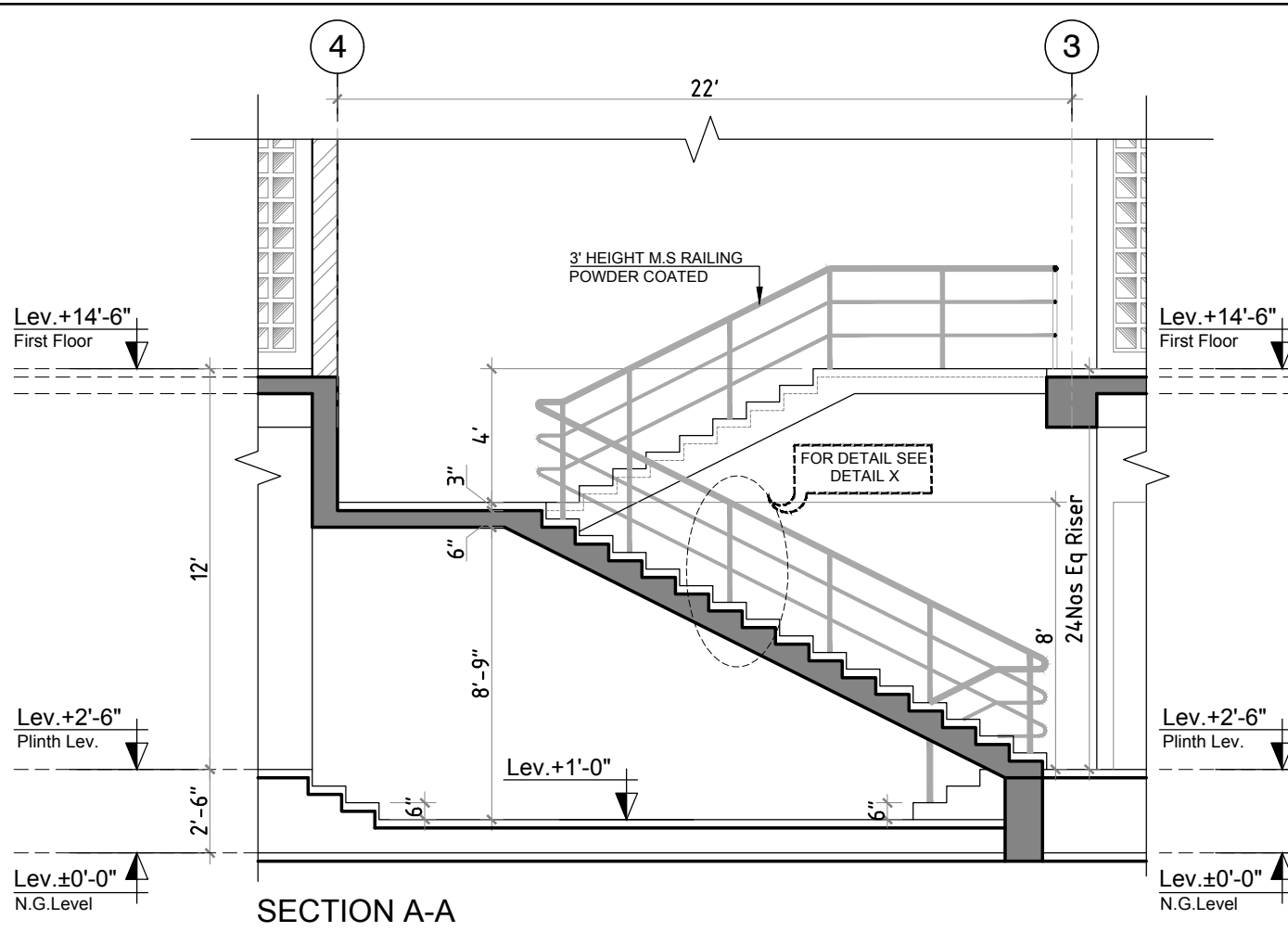


SECTION F-F

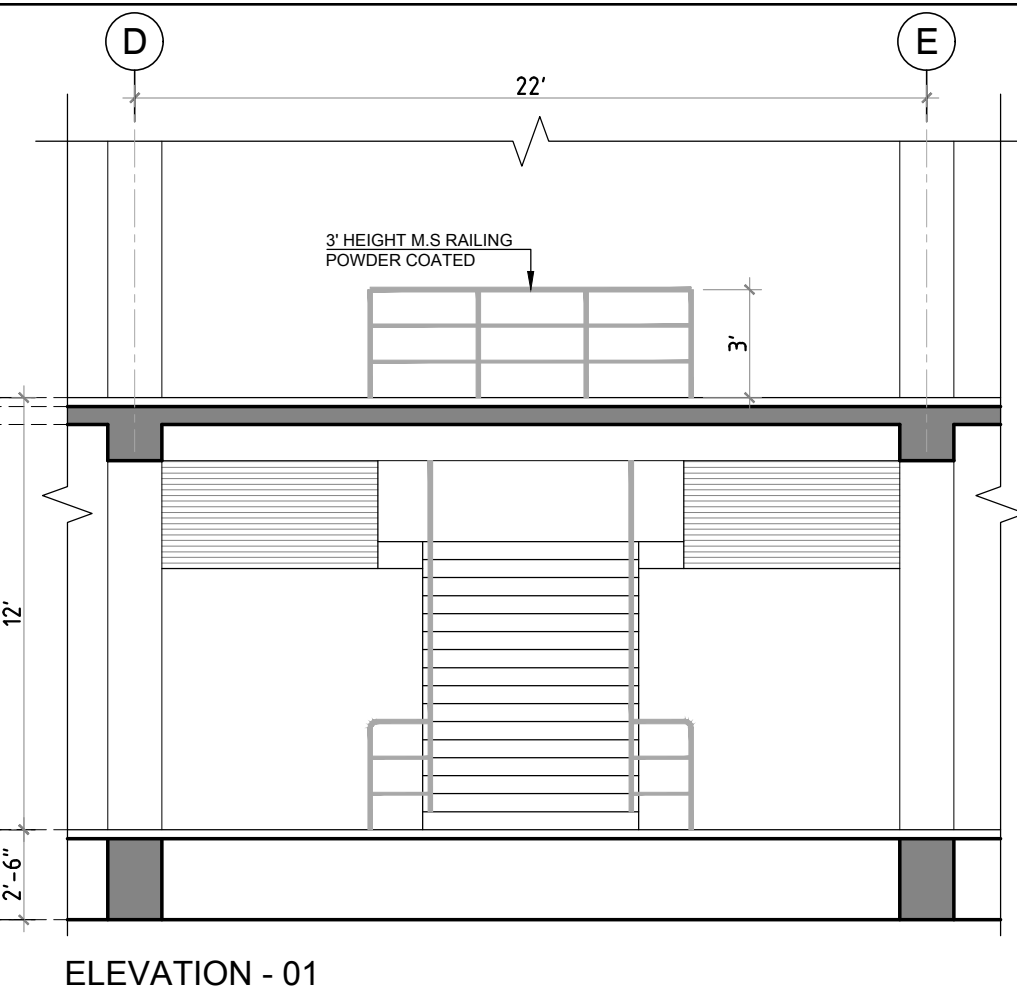
REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
PRINCIPLE TOILET & PANTRY DETAIL		
ARCHITECT:	HABIB FIDA ALI Architects	Scale 3/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES Engineering & Architectural Consultant	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates Electrical & Mechanical Consultant	Drawn DANIYAL
PLUMBING CONSULTANT:	N.A. ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERING	Checked ASIF USMANI
		Drawing No A-13



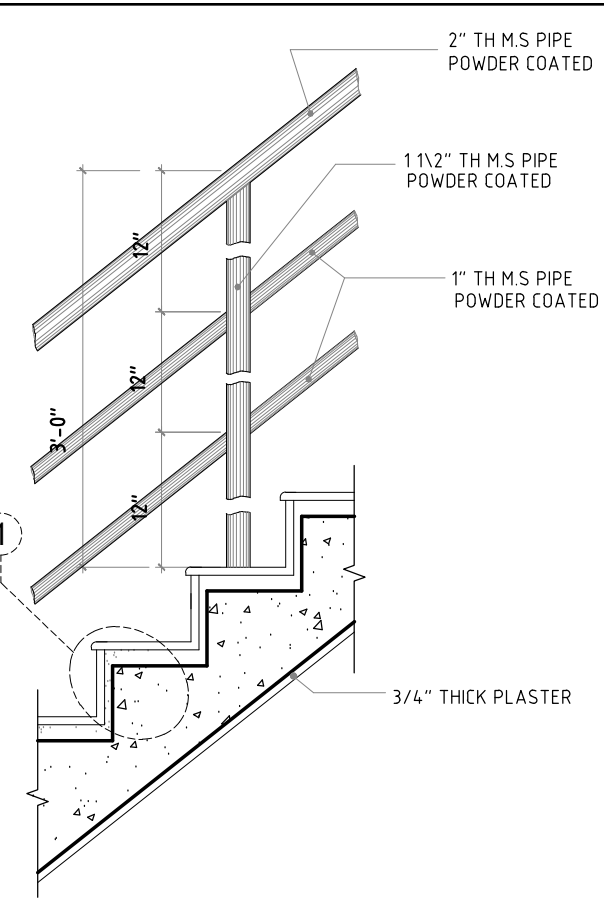
REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
DISABLE TOILET DETAIL		
ARCHITECT:	HABIB FIDA ALI Architects	Scale 1/4" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn DANIYAL
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-14



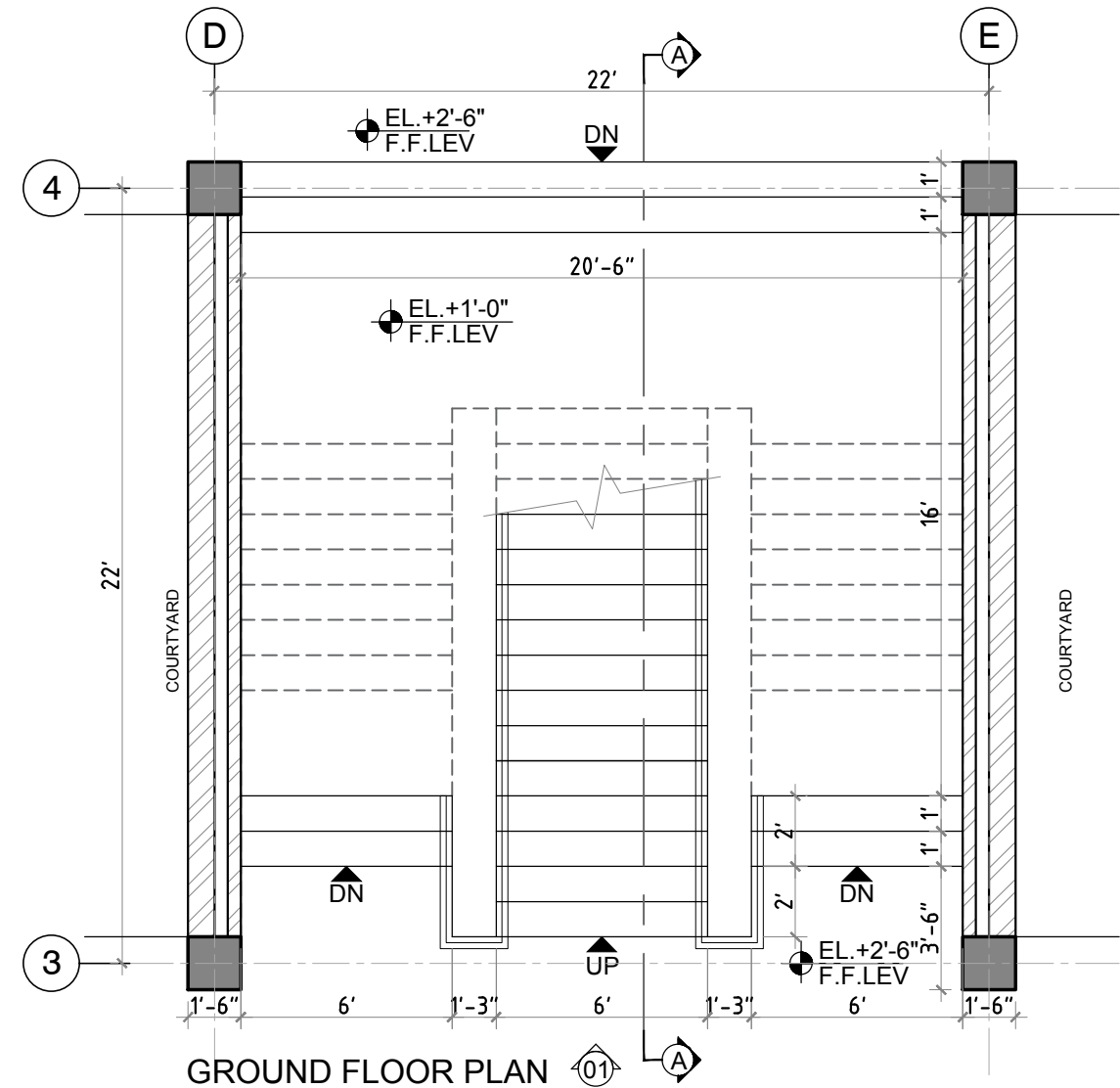
SECTION A-A



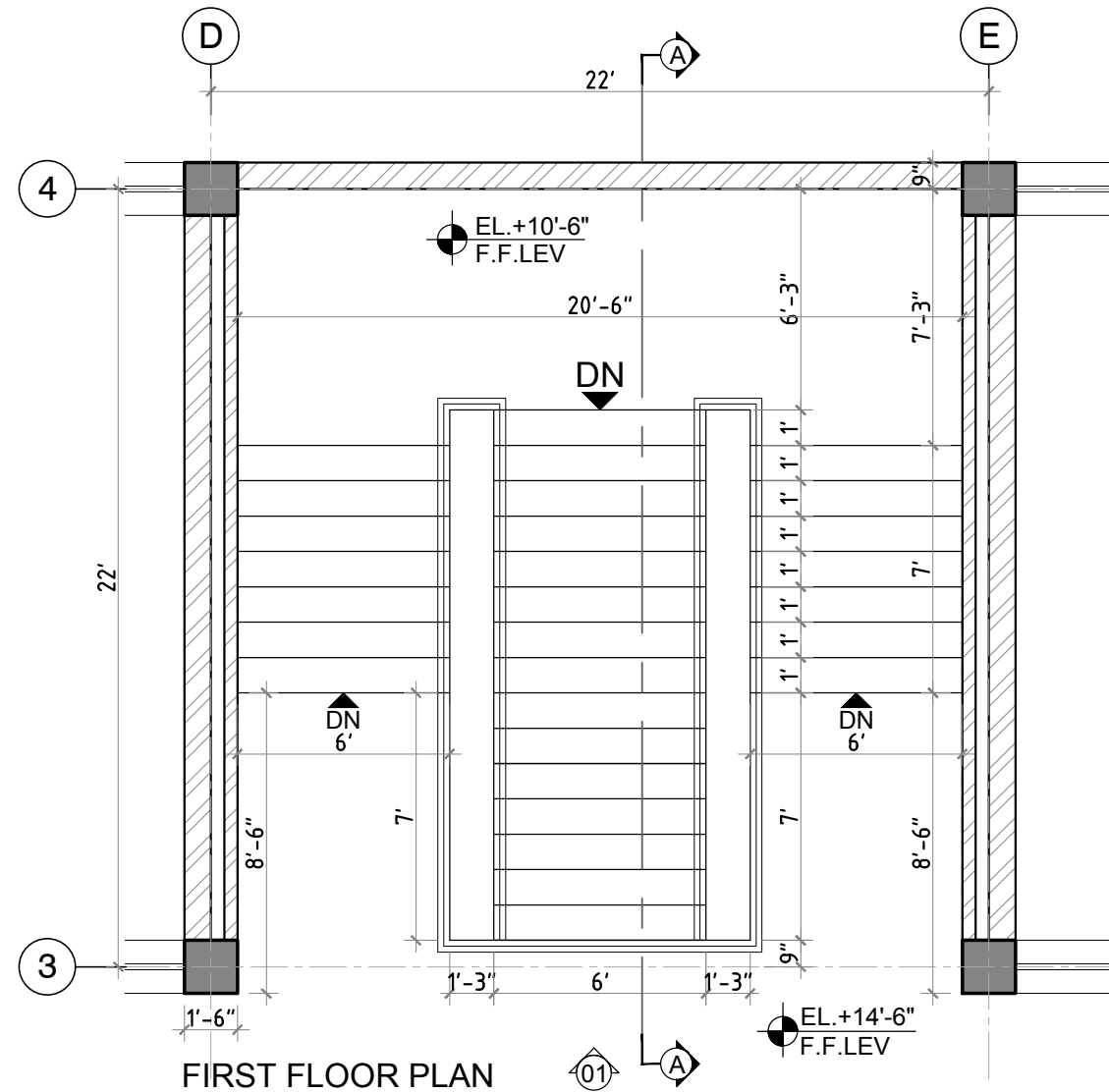
ELEVATION - 01



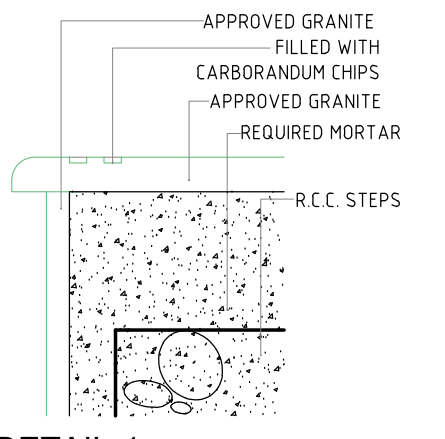
DETAIL-X



GROUND FLOOR PLAN

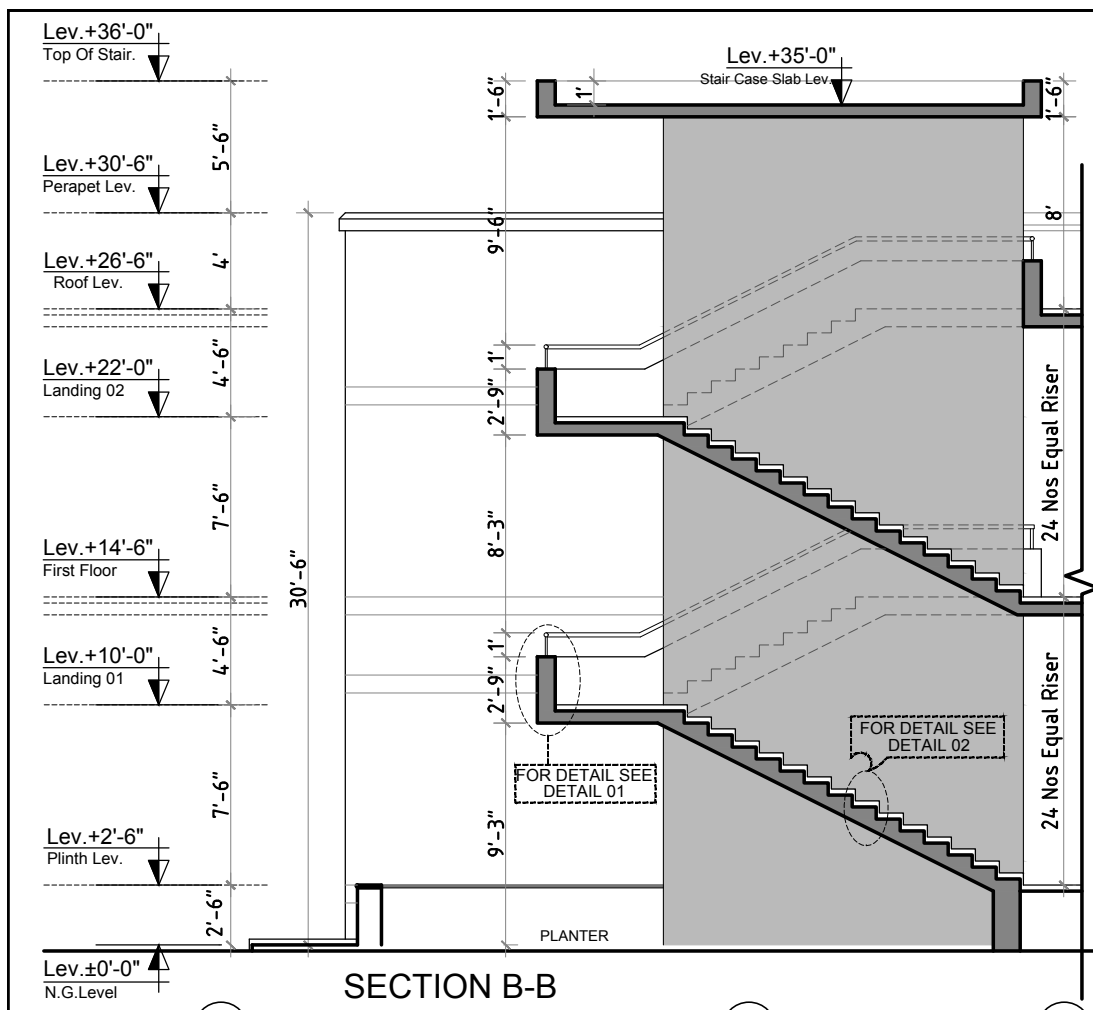


FIRST FLOOR PLAN

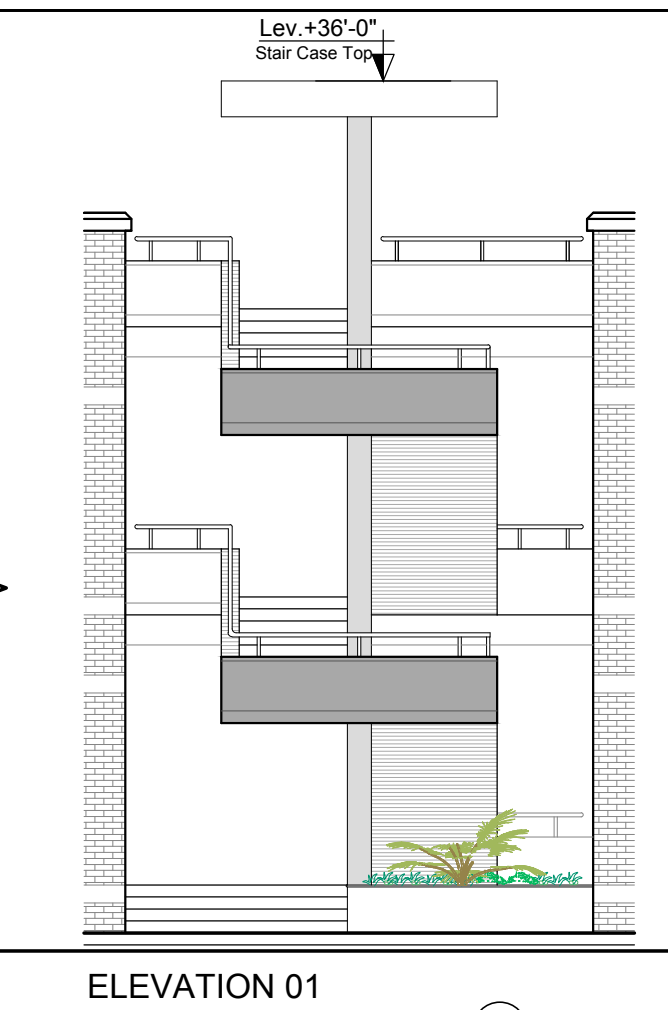


DETAIL-1

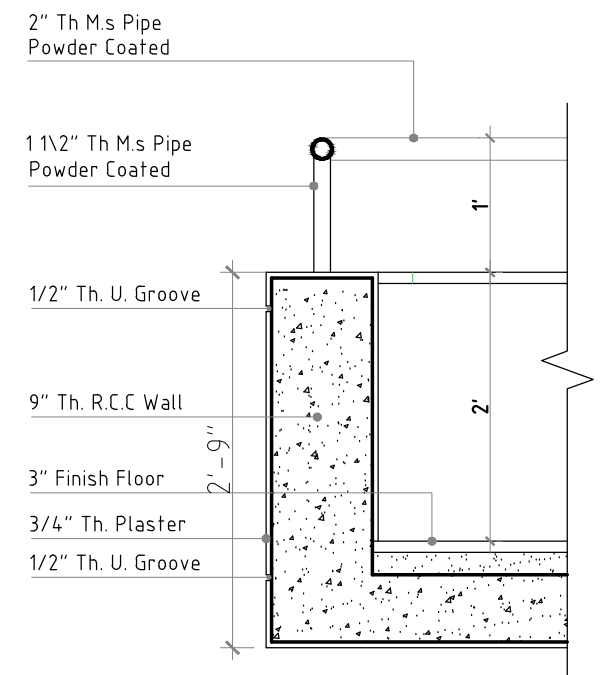
REV.	DATE	
Issued For FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
STAIR CASE 01 DETAIL		
ARCHITECT :		Scale 3/16" = 1'-0"
HABIB FIDA ALI		Date Sep, 2021
STRUCTURE ENGINEER :		Drawn MEHROZ
LOYA ASSOCIATES		Checked ASIF USMANI
ELECTRICAL CONSULTANT:		Drawing No A-15
Design & Development Engineering Associates		
PLUMBING CONSULTANT :		
N.A. ASSOCIATES		



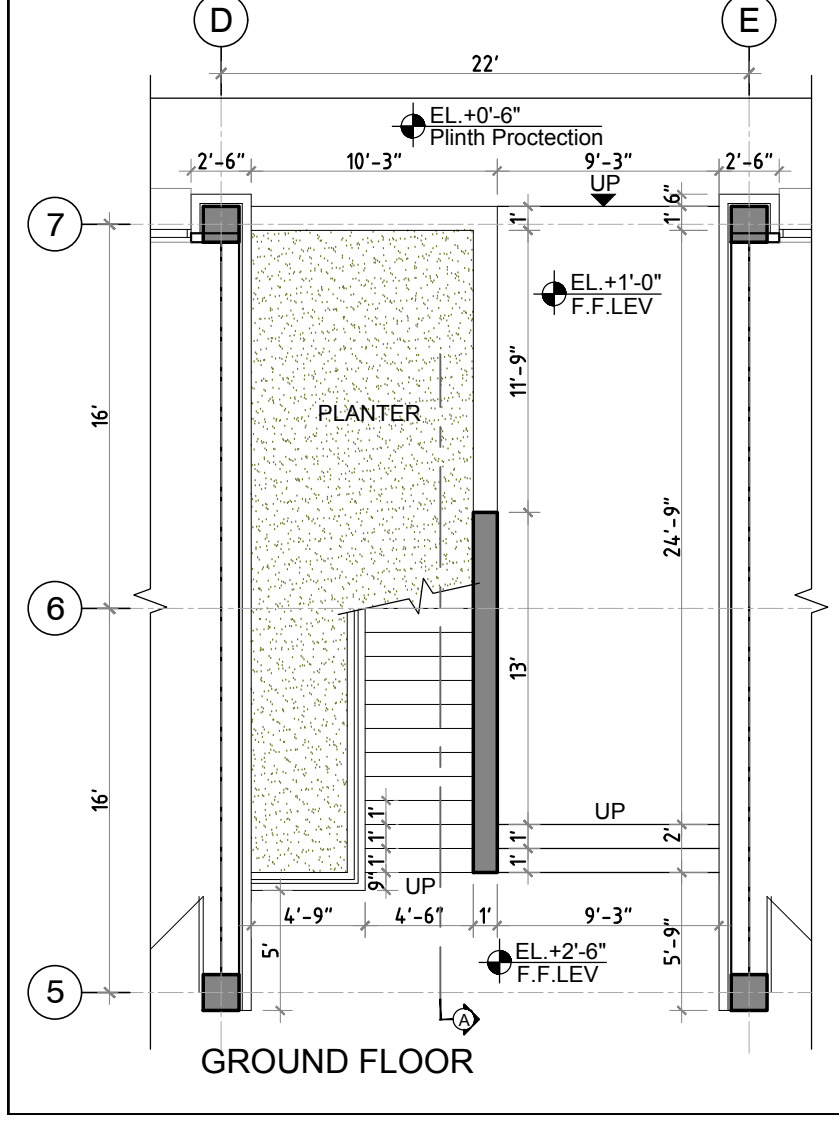
SECTION B-B



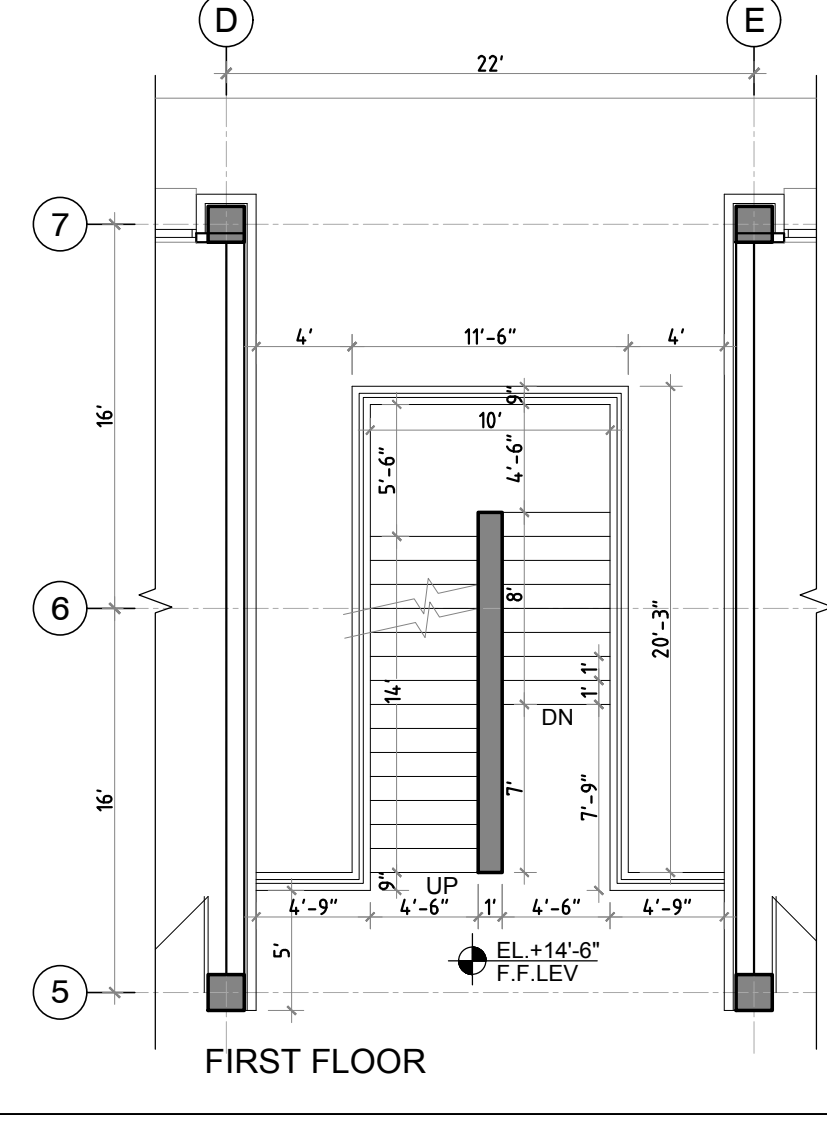
ELEVATION 01



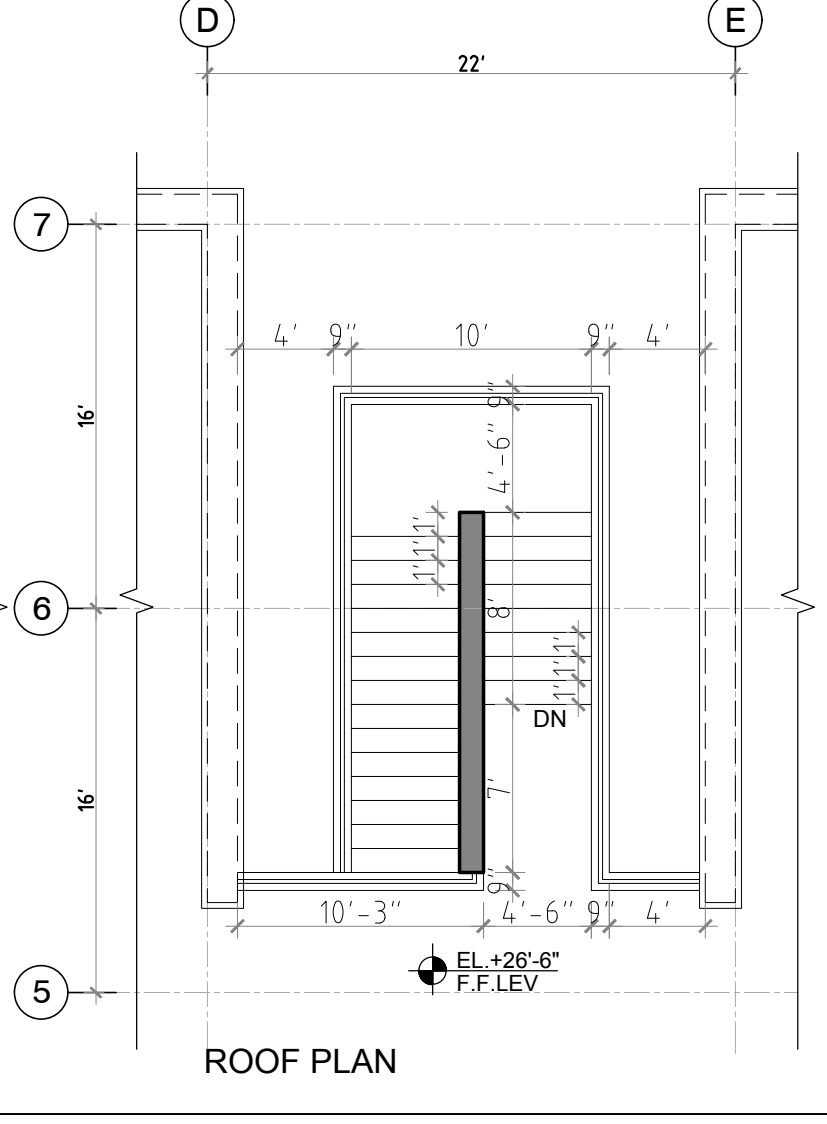
DETAIL-01



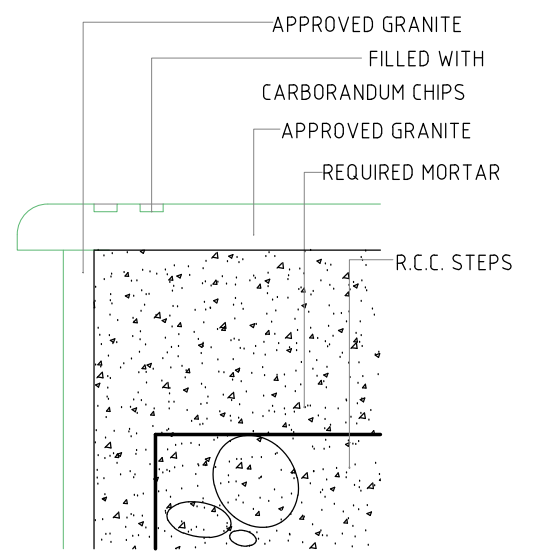
GROUND FLOOR



FIRST FLOOR

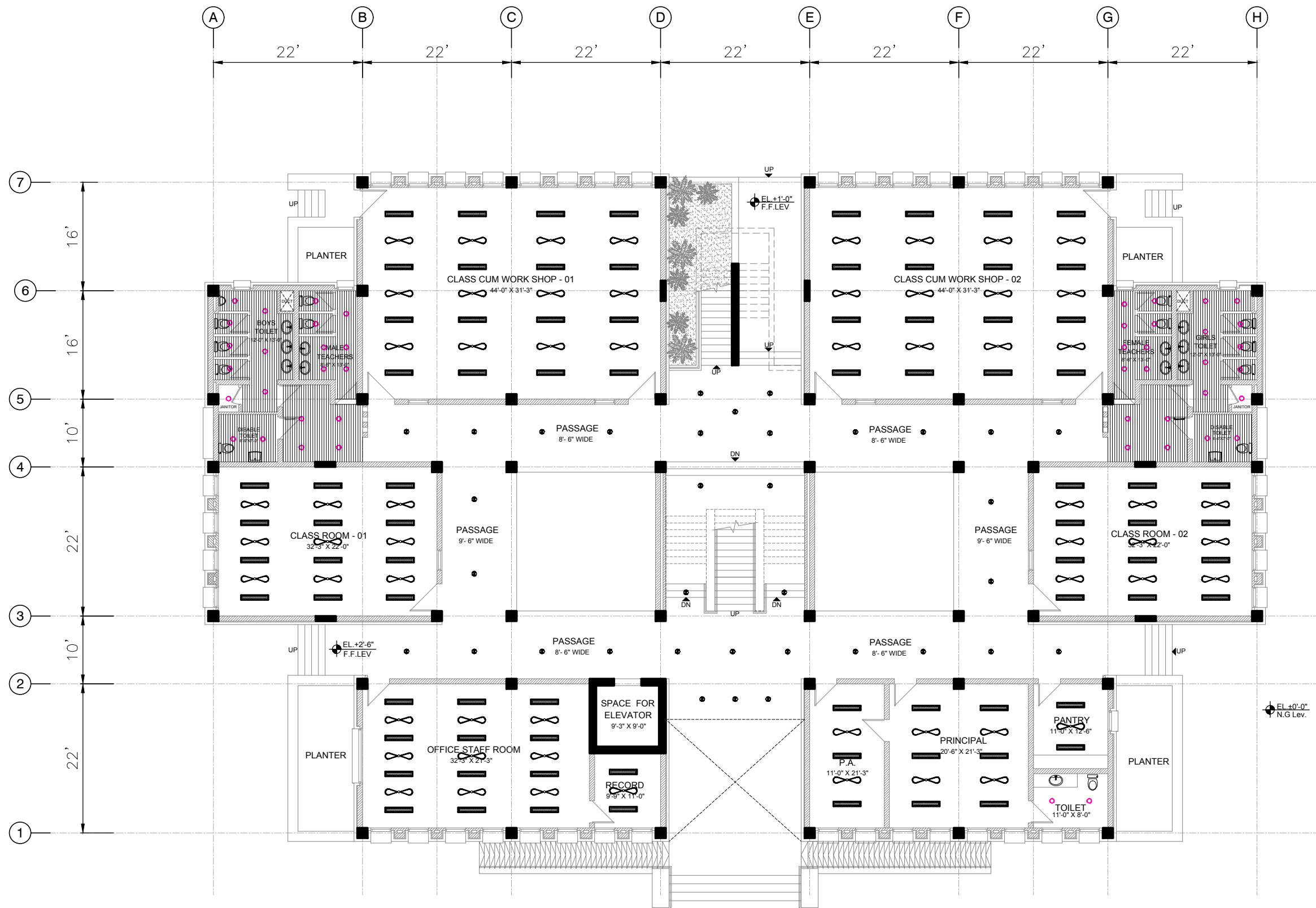


ROOF PLAN

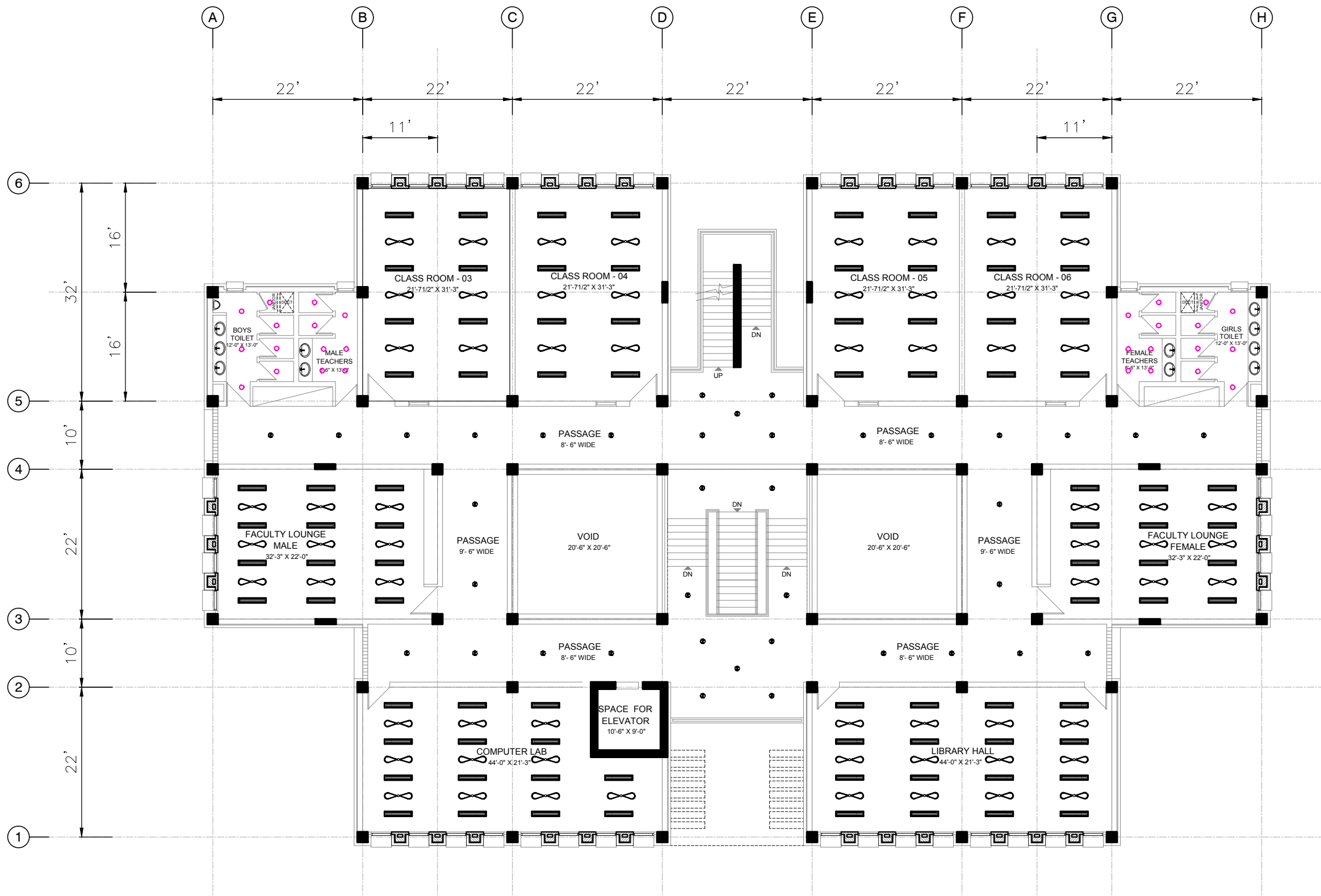


DETAIL-02

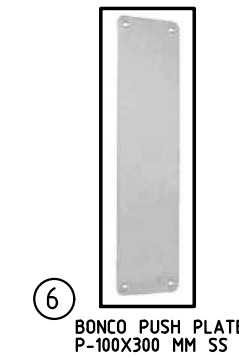
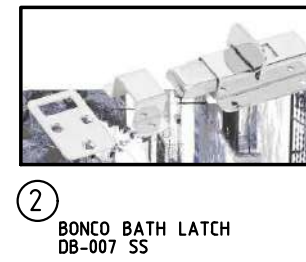
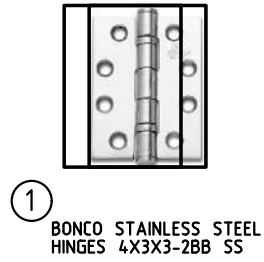
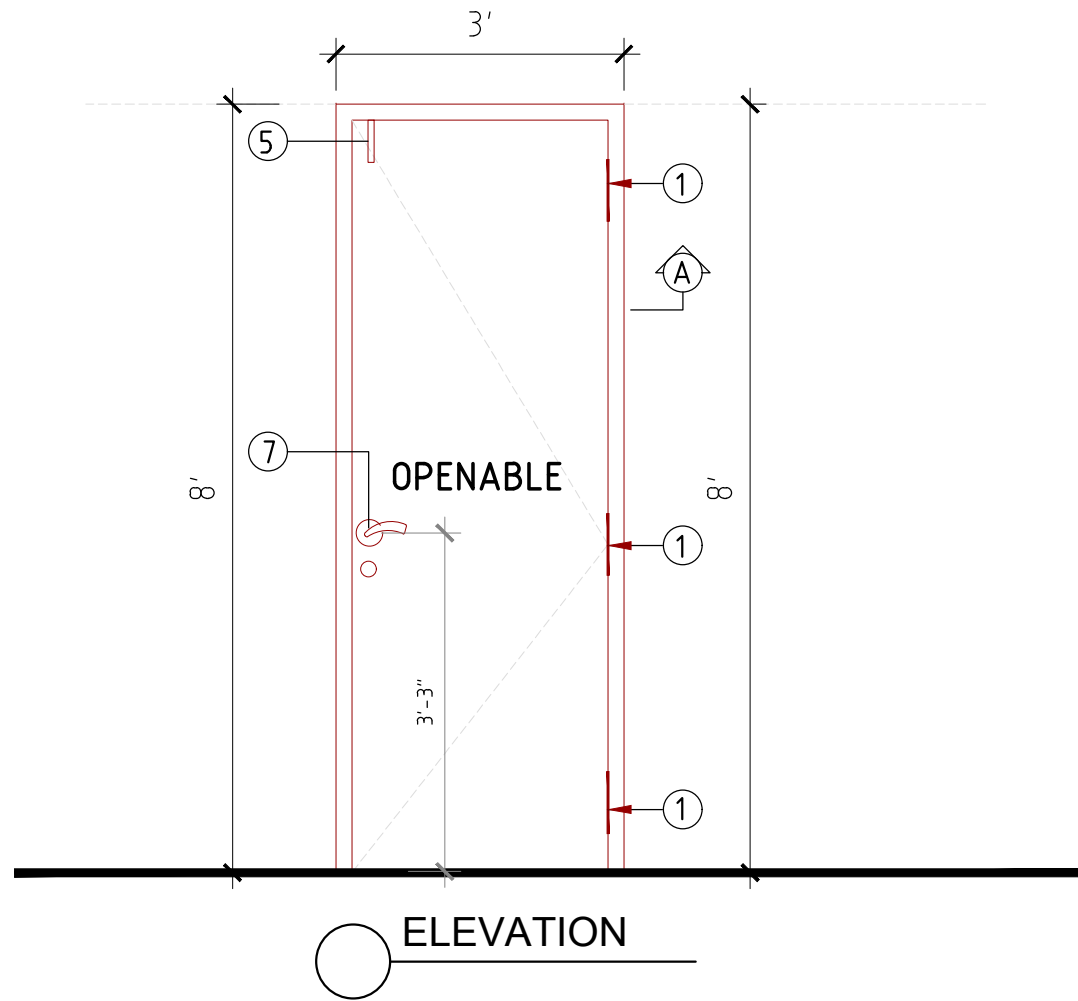
REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
STAIR CASE 02 DETAIL		
ARCHITECT:	HABIB FIDA ALI	Scale
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked
		ASIF USMANI
		Drawing No
		A-16



REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
GROUND FLOOR PLAN CEILING PLAN		
ARCHITECT:	HABIB FIDA ALI ARCHITECT	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn MEHROZ
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-17



REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
FIRST FLOOR CEILING PLAN		
ARCHITECT:	HABIB FIDA ALI ARCHITECTS G-11, F-10, Jinnah Road, Jinnah Colony, F-7/2, Islamabad	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER:	LOYA ASSOCIATES ARCHITECTS & ENGINEERS G-11, F-10, Jinnah Road, Jinnah Colony, F-7/2, Islamabad	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates ELECTRICAL & MECHANICAL CONSULTANTS G-11, F-10, Jinnah Road, Jinnah Colony, F-7/2, Islamabad	Drawn MEHROZ
PLUMBING CONSULTANT:	N.A. ASSOCIATES MECHANICAL, ELECTRICAL & PLUMBING ENGINEERS G-11, F-10, Jinnah Road, Jinnah Colony, F-7/2, Islamabad	Checked ASIF USMANI
		Drawing No A-18



① BONCO STAINLESS STEEL HINGES 4X3X3-2BB SS

② BONCO BATH LATCH DB-007 SS

③ BONCO PULL HANDLE SHA-10-152 MM SS

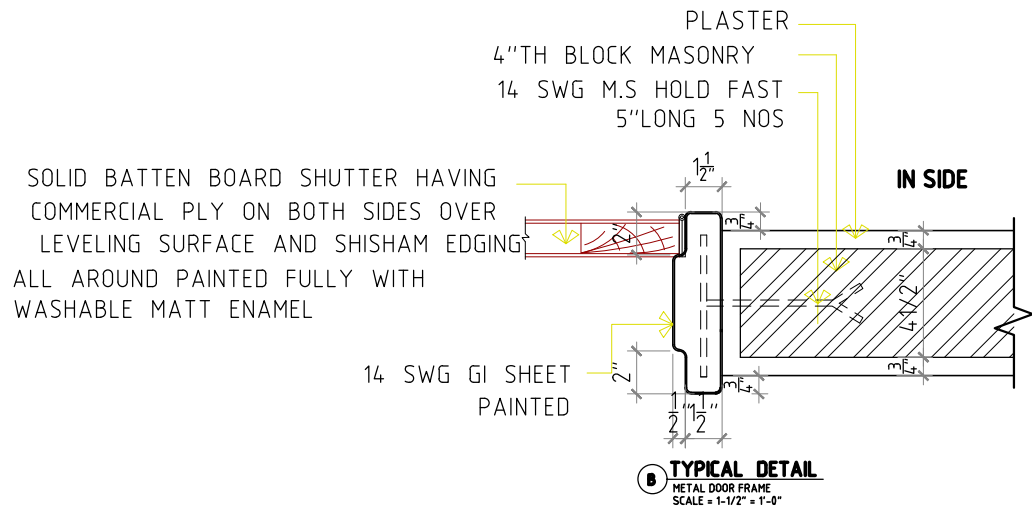
④ BONCO FLOOR STOPPER DS-003 SCP (TO BE FIXED ON APPROPRIED POSITION)

⑤ BONCO FLUSH BOLT FB-672 8" SCP

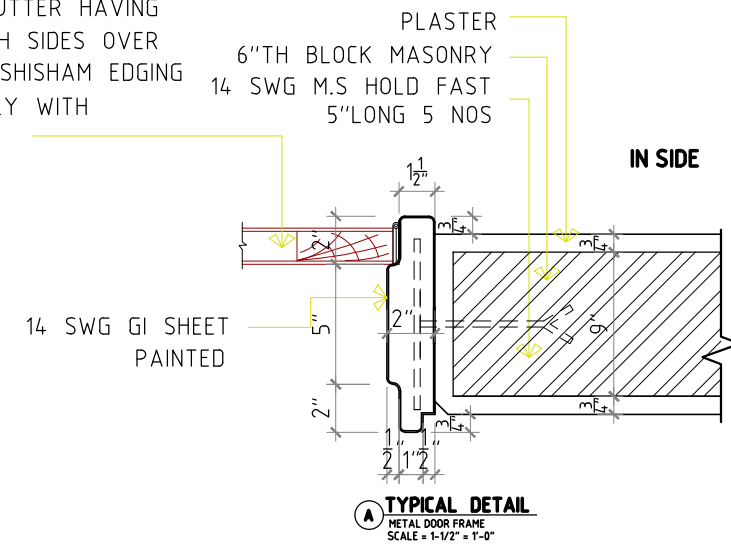
⑥ BONCO PUSH PLATE P-100X300 MM SS

⑦ MANDELI LEVER HANDLE 771Y STAIN CHROME WITH BONCO LOCK

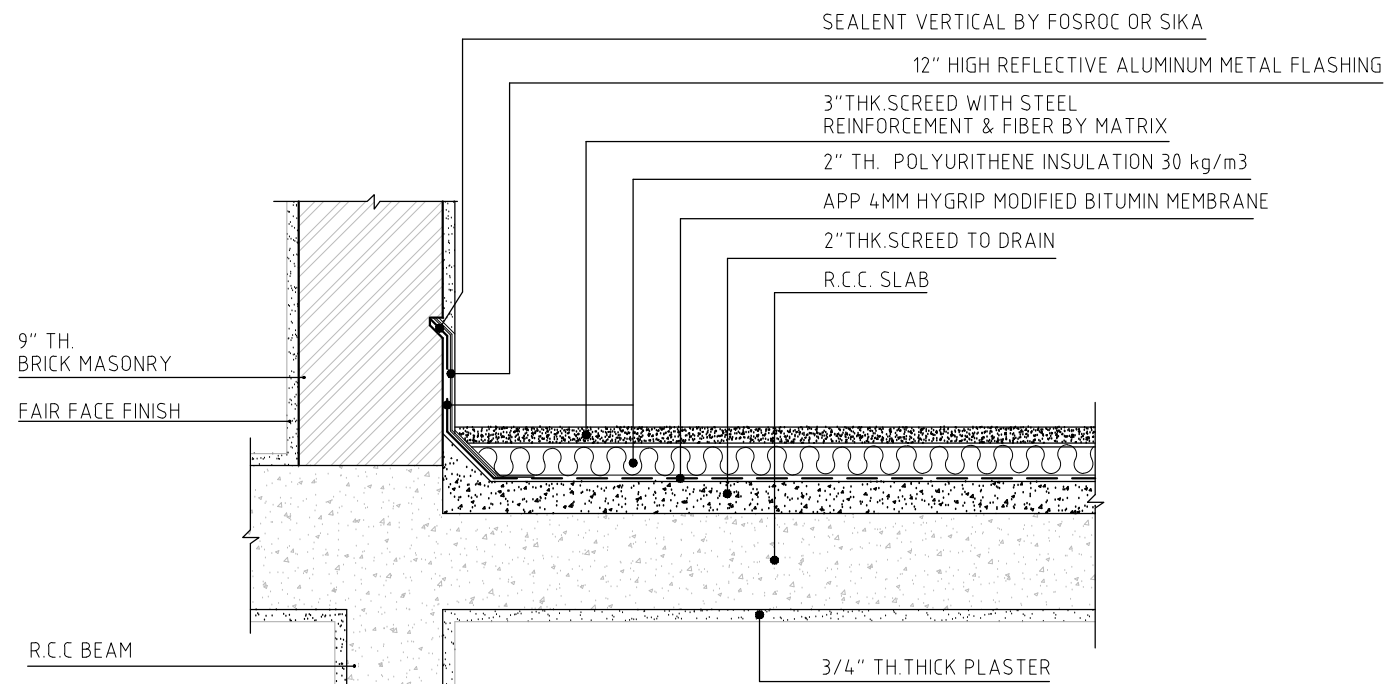
⑧ NEW STAR DOOR CLOSER JAPAN MADE MADE # 82 45 KG DOOR WEIGHT(ONLY RATES)



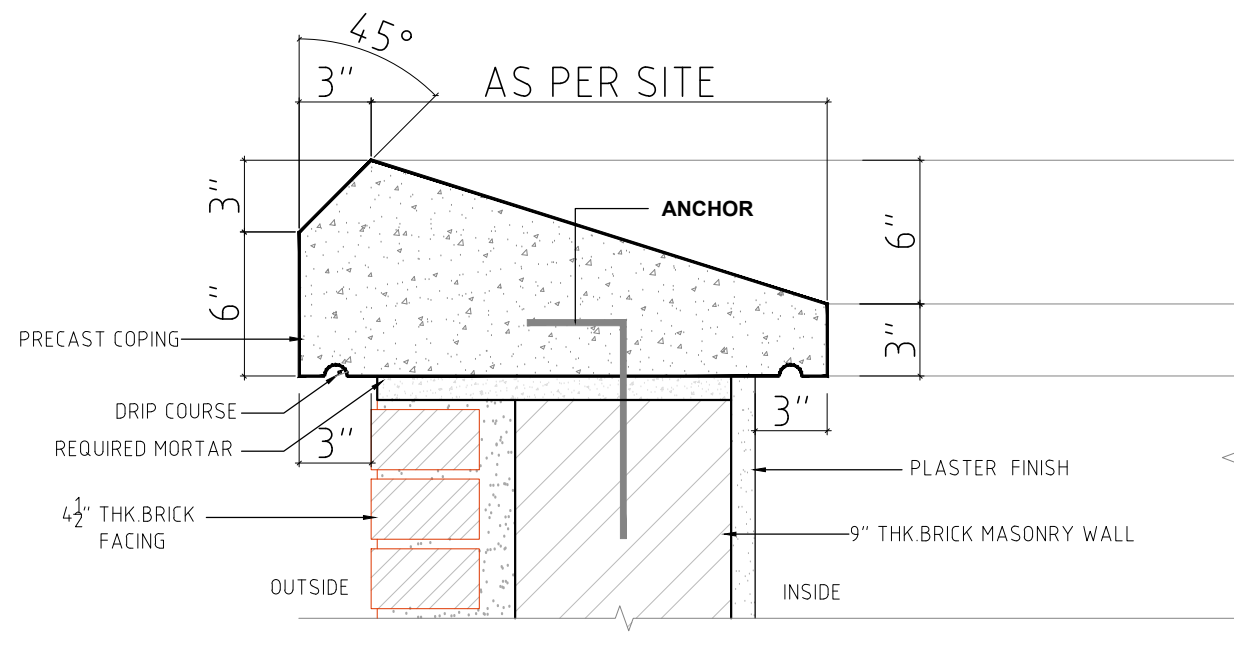
SOLID BATTEN BOARD SHUTTER HAVING COMMERCIAL PLY ON BOTH SIDES OVER LEVELING SURFACE AND SHISHAM EDGING ALL AROUND PAINTED FULLY WITH WASHABLE MATT ENAMEL



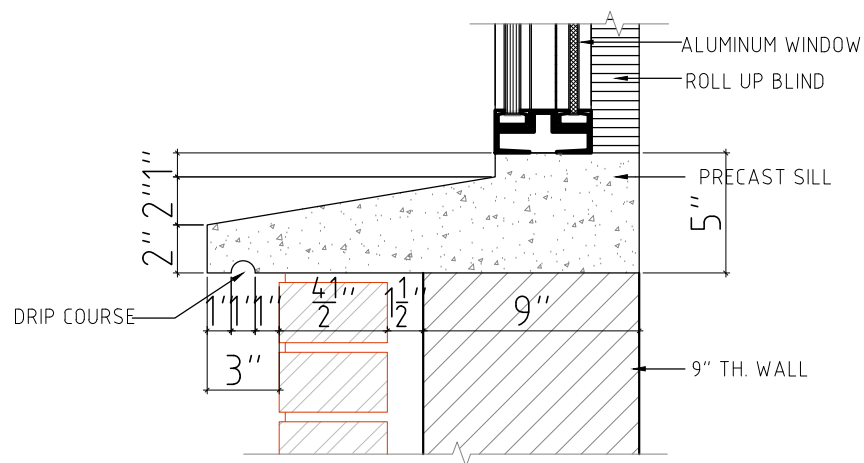
REV.	DATE	
Issued For FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
IRON MANGORY		
ARCHITECT :	HABIB FIDA ALI	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES	Date Sep,2021
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates	Drawn MEHROZ
PLUMBING CONSULTANT :	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-19



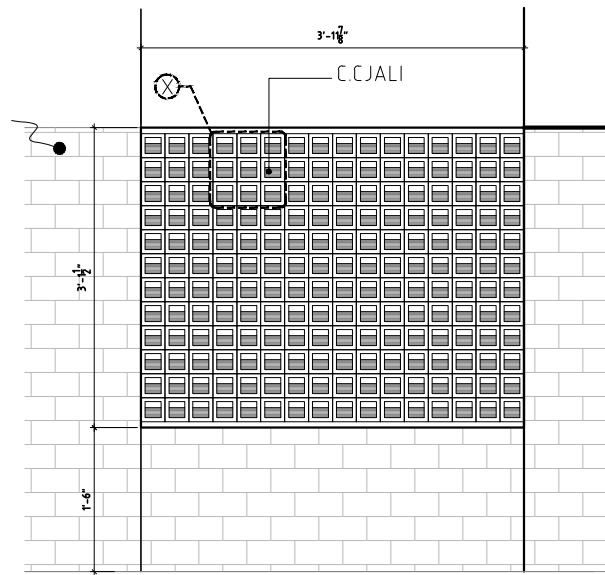
ROOFING SYSTEM
N.T.S



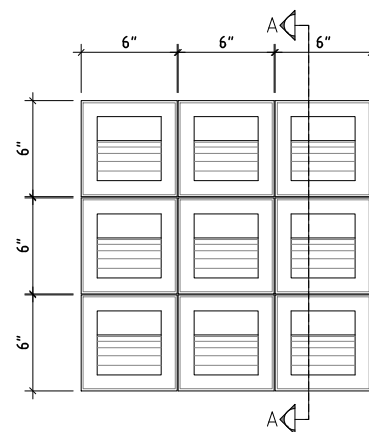
PRECAST COPING DETAIL
N.T.S



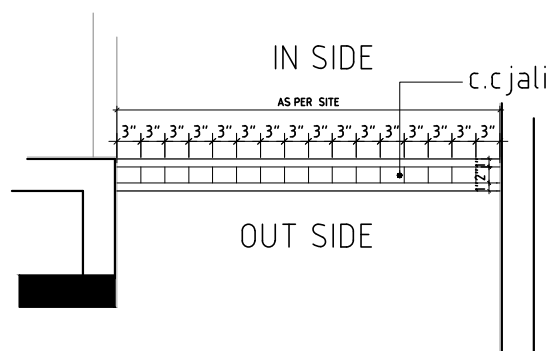
PRECAST SILL
N.T.S



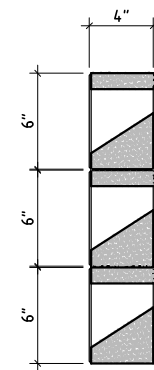
C.C. JALI ELEVATION



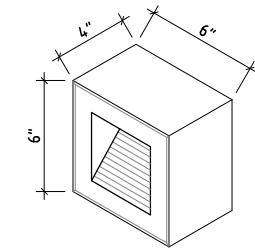
DETAIL



C.C. JALI PLAN



SECTION



ISOMETRIC VIEW

REV.	DATE	
Issued For		
FOR TENDER		
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
MISCELLANEOUS DETAILS		
ARCHITECT:	HABIB FIDA ALI ARCHITECTS	Scale N.T.S
STRUCTURE ENGINEER:	LOYA ASSOCIATES	Date Sep, 2021
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates	Drawn MEHROZ
PLUMBING CONSULTANT:	N.A. ASSOCIATES	Checked ASIF USMANI
		Drawing No A-20

ARCHITECTURAL DRAWINGS

FOR TENDER

SEPTEMBER 2021

**SUKKUR INSTITUTE OF BUSINESS
ADMINISTRATION
(SIBA)
(COMMUNITY COLLEGE JACOBABAD)**

S.NOS	LIST OF DRAWINGS	REV#
A-01	GROUND FLOOR PLAN (WORKING PLAN)	
A-02	FIRST FLOOR PLAN (WORKING PLAN)	
A-03	ROOF PLAN (WORKING PLAN)	
A-04	ELEVATION 01 AND 02 (FRONT & RIGHT)	
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A-07	SCHEDULE OF JOINERY	
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A-09	MALE TOILETS DETAIL ON GROUND FLOOR	
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A-11	MALE TOILETS DETAIL ON FIRST FLOOR	
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SEPTEMBER 2021

(SIBA)
(COMMUNITY COLLEGE JACOBABAD)

FOR TENDER
SEPTEMBER 2021

ELECTRICAL DRAWINGS

FOR TENDER

SEPTEMBER 2021

SIBA COMMUNITY COLLEGE

JACOBABAD NAUSHERO FEROUZE

Electrical, Telephone, CC-TV, Fire Alarm &
Computer Data Networking System Works

TENDER DRAWINGS

Architect

HABIB FIDA ALI

- ARCHITECTURE INTERIORS
 - URBAN DESIGN PROJECT MANAGEMENT
- 4, CH. KHALIQUZZAMAN ROAD, KARACHI - 75530.
PHONE NO. 5661683, 5661720,

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Design & Development Engineering Associates

Electrical & Mechanical Consultant

Suit No. 404 / B2 4th. floor Hannan Center 55 D.A.C.H.S Main Shahrah-e-faisal






Karachi. Tel. 021-34544674 CELL # 0321-2250021

EMAIL engineer_fareed@yahoo.com




DRAWING LIST

DRAWING NO.	TITLE
E-00	TITLE PAGE
E-01	DRAWING LIST & LEGEND
E-02	GENERAL NOTES
E-03	EARTH PIT DETAIL
E-04	DETAIL-A
E-05	SINGLE LINE DIAGRAM FOR DATA SYSTEM
E-06	SINGLE LINE DIAGRAM FOR CAMERA SYSTEM
E-07	GROUND FLOOR LIGHTING LAYOUT
E-08	GROUND FLOOR POWER, TELEPHONE, & DATA, SPLIT UNIT SYSTEM LAYOUT
E-09	GROUND FLOOR FIRE ALARM & CC-TV SYSTEM LAYOUT
E-10	1ST. FLOOR LIGHTING LAYOUT
E-11	1ST. FLOOR POWER, TELEPHONE, & DATA, SPLIT UNIT SYSTEM LAYOUT
E-12	1ST. FLOOR FIRE ALARM & CC-TV SYSTEM LAYOUT
E-13	ROOF ELECTRICAL LAYOUT
E-14	SINGLE LINE DIAGRAM FOR L.DBs
E-15	SINGLE LINE DIAGRAM FOR MAIN D.B+ P.F.I




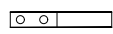








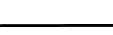
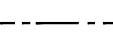












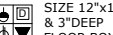


LEGEND FOR FIRE ALARM SYSTEM

SYMBOLS	DESCRIPTION	HEIGHT FROM F.F.L OR LOCATION
	SMOKE DETECTOR	CEILING
	HEAT DETECTOR	CEILING
	BELL / SOUNDER	FROM F.F.L -7'
	MANUAL BREAK GLASS STATION	FROM F.F.L -4'
	FIRE ALARM CONTROL PANEL	AS PER SITE

LEGEND FOR CC-TV SYSTEM

SYMBOL	DESCRIPTION	HEIGHT FROM F.F.L
	5A S.P SWITCH SOCKET (UPS POWER)	AS PER SITE
	CC-TV CAMERA	F.F.L 7'-6" OR 8'
	CC-TV MONITOR	AS PER SITE

ELECTRICAL LEGEND

SYMBOLS	DESCRIPTION	HEIGHT FROM F.F.L
	10A S.P SWITCH (SWITCH BOX)	FROM F.F.L 42"
	PHILIPS MAKE LED DOWN LIGHT 6W	SURFACE
	PHILIPS MAKE 1200x300mm LED LIGHT PANEL	SURFACE
	PHILIPS MAKE LED MIRROR LIGHT	FROM F.F.L 6'-6"
	PHILIPS MAKE LED DOWN LIGHT 10W	SURFACE
	PHILIPS MAKE BULK HEAD LIGHT FIXTURE WITH 20W PLC LAMP	AS PER SITE
	WALL BRACKET FAN 80W	FROM F.F.L 7'-6"
	EXHAUST FAN (12" DIA)	FROM F.F.L 8'-6"
	5A SHAVER SWITCH SOCKET 2PIN	FROM F.F.L 42"
	SPLIT UNIT (INDOOR UNIT)	AS PER SITE COND.
	SPLIT UNIT CONDENSER	AS PER SITE COND.
	LED CABLE OUTLET	FROM F.F.L 4'-6"
	CONDUIT RUN UNDER CEILING SLAB	_____
	CONDUIT RUN UNDER FLOOR	_____
	CONDUIT RUN UNDER WALL	_____
	L.DB (DISTRIBUTION BOARD)	FROM F.F.L TO TOP OF L.DB 7'-0"
	P. DB-UPS (POWER DISTRIBUTION BOARD)	FROM F.F.L TO TOP OF L.DB 7'-0"
	T.J.B (TELEPHONE JUNCTION BOX)	FROM F.F.L -12"
	COMPUTER DATA OUTLET RJ-45	FROM F.F.L -12"
	13A 3PIN (FLAT PINS) S.P SWITCH SOCKET (UPS POWER)	FROM F.F.L -12"
	BELL / BELL PUSH	BEEEL F.F.L TO 7' BELL PUSH F.F.L 42"
	15A POWER SOCKET	FROM F.F.L TO MID POINT OF BOX 1'-0"
	5A /10A 3PIN LIGHT PLUG	FROM F.F.L TO MID POINT OF BOX 1'-0"
	TELEPHONE OUTLET (RJ-11)	FROM F.F.L TO MID POINT OF BOX 1'-0"
	DATA OUTLET & OUTLET & 10A S.P SOCKET (NORMAL POWER) & 2x13A S.P SOCKET (UPS POWER)	FROM F.F.L -12"
	DATA OUTLET & TELEPHONE OUTLET & 10A S.P SOCKET (NORMAL POWER) & 2x13A S.P SOCKET (UPS POWER)	FROM F.F.L -12"
	DATA OUTLET & TELEPHONE OUTLET & 10A S.P SOCKET (NORMAL POWER) & 2x13A S.P SOCKET (UPS POWER)	UNDER FLOOR
	20A D.P MCB IN POWDER COATED M.S BOX WITH NEUTRAL & EARTH BAR	AS PER SITE
	TOA MAKE 10W CEILING SPEAKER	SURFACE

SIBA

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EMAIL engineer_fareed@yahoo.com

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

ELECTRICAL LEGEND

Approved By

Checked By Engr.Fareed ul Haq

Drawn By Salman Khan

Scale NTS

Date 11-01-2019

Drawing # E-01

GENERAL NOTES

1	ALL WIRING FOR LIGHTING AND POWER SHALL BE WITH SINGLE CORE PVC INSULATED CABLES LAID IN PVC CONDUITS OF 3/4"Ø OR HIGHER EXCEPT NOTED OTHERWISE																		
2	<p>SIZE OF CABLE SHALL BE AS GIVEN BELOW UNLESS OTHERWISE INDICATED: (FOR DETAIL SEE B.O.Q)</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">LIGHT POINT / FAN POINT</td> <td style="width: 30%; text-align: center;">2x1.5mm² + 1x1.5mm²</td> <td rowspan="7" style="width: 10%; text-align: center; vertical-align: middle;">} For Earth } 1" dia pvc pipe</td> </tr> <tr> <td>LIGHT CIRCUITS</td> <td style="text-align: center;">2x2.5mm² + 1x2.5mm²</td> </tr> <tr> <td>10A / 13A SOCKET OUTLET</td> <td style="text-align: center;">2x2.5mm² + 1x2.5mm²</td> </tr> <tr> <td>15AMP SOCKET OUTLET</td> <td style="text-align: center;">2x4.0mm² + 1x2.5mm²</td> </tr> <tr> <td>SPLIT UNIT 2TON</td> <td style="text-align: center;">2x6.0mm² + 1x4mm²</td> </tr> <tr> <td>DATA OUTLET</td> <td style="text-align: center;">4PAIR CAT-6 CABLE</td> </tr> <tr> <td>TELEPHONE OUTLET</td> <td style="text-align: center;">4PAIR CAT-5E CABLE</td> </tr> <tr> <td style="text-align: center;">T.V CABLE OUTLET</td> <td style="text-align: center;">RG-6 CABLE</td> <td></td> </tr> </table>	LIGHT POINT / FAN POINT	2x1.5mm ² + 1x1.5mm ²	} For Earth } 1" dia pvc pipe	LIGHT CIRCUITS	2x2.5mm ² + 1x2.5mm ²	10A / 13A SOCKET OUTLET	2x2.5mm ² + 1x2.5mm ²	15AMP SOCKET OUTLET	2x4.0mm ² + 1x2.5mm ²	SPLIT UNIT 2TON	2x6.0mm ² + 1x4mm ²	DATA OUTLET	4PAIR CAT-6 CABLE	TELEPHONE OUTLET	4PAIR CAT-5E CABLE	T.V CABLE OUTLET	RG-6 CABLE	
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DATA OUTLET	4PAIR CAT-6 CABLE																		
TELEPHONE OUTLET	4PAIR CAT-5E CABLE																		
T.V CABLE OUTLET	RG-6 CABLE																		
3	EACH CIRCUIT TO HAVE ITS INDEPENDENT NEUTRAL AND EARTH FROM DB																		
4	THE CONDUIT SHALL HAVE A MINIMUM COVERING OF 20 mm OF CONCRETE/TILES, ETC.																		
5	INSPECTION BOX, PULL BOX, JUNCTION BOX, ETC. SHALL BE PROVIDED WHERE NECESSARY TO PULL THE WIRE CONVENIENTLY.																		
6	ALL BACK BOXES SHALL BE OF 16 SWG SHEET STEEL EPOXY PAINTED WITH PROVISION FOR EARTH CONNECTION.																		
7	FOR EXACT LOCATION OF LIGHTING FIXTURES REFER TO ARCHITECTURAL DRAWINGS.																		
8	ALL CONDUITS RUN ABOVE FALSE CEILING SHALL BE LABELED / IMPRINTED WITH THE NAMES OF RESPECTIVE SERVICES.																		
9	WIRING FOR TELEPHONES TO BE WITH 4 PAIR CAT-5E CABLE OR AS NOTED OTHERWISE.																		
10	WIRING FOR SPEAKERS AND FIRE ALARM SYSTEM TO BE WITH 2x1.5 SQMM, 1CORE PVC CABLES. EXCLUDING BELL																		
11	WIRING FOR MATV, CCTV AND DVD TO BE WITH COAXIAL COPPER SHIELDED CABLE OR AS NOTED OTHERWISE.																		
12	DIFFERENT SYSTEM WIRING TO RUN IN DIFFERENT CONDUITS.																		
13	CONTRACTOR MUST COORDINATE WITH OTHER TRADE DRAWINGS																		
14	DO NOT SCALE THE DRAWINGS																		
15	THE ELECTRICAL RESISTANCE OF ECC TOGETHER WITH EARTH LEAD AND ELECTRODE SHOULD NOT EXCEED ONE OHM. IF IT EXCEEDS, THE CONTRACTOR SHALL OBTAIN INSTRUCTION FROM CONSULTANT FOR ANY CHANGES.																		
16	THE MAKES STATED IN THE TENDER DRAWINGS/DOCUMENTS ARE FOR REFERENCE TO A PARTICULAR CLASS OF QUALITY OR PERFORMANCE REQUIREMENT. EQUIVALENT OR BETTER MAKES COULD ALSO BE OFFERED. APPROVAL OF EQUIVALENCE OF MAKES SHALL BE THE DISCRETION OF CONSULTANT/OWNER.																		

SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

GENERAL NOTES

Approved By

Checked By Engr.Fareed ul Haq

Drawn By Salman Khan

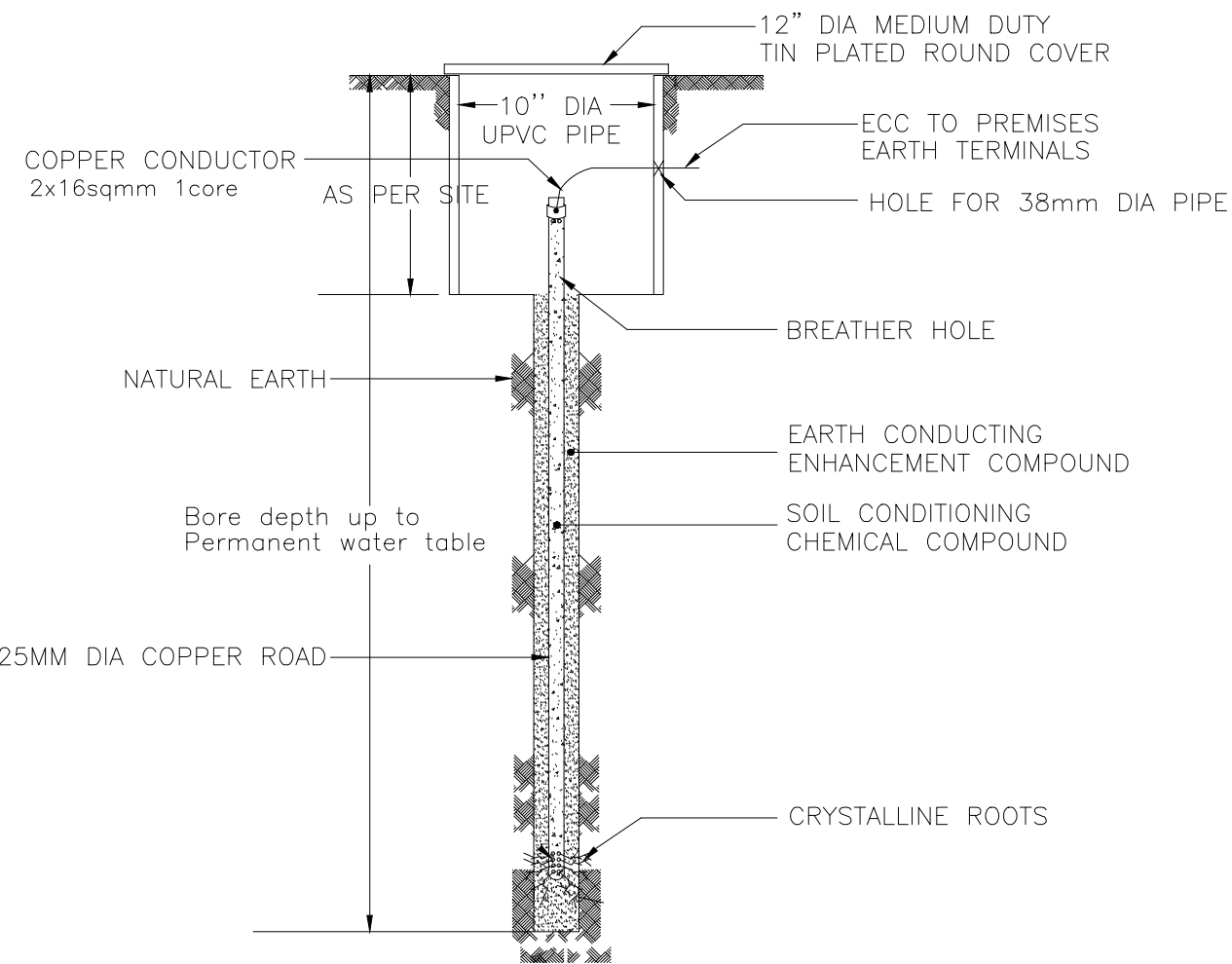
Scale NTS

Date 11-01-2019

Drawing # E-02

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EARTH PIT DETAIL

WIRING SCHEDULE

	DESCRIPTION	CABLE SIZE CUJ/PVC	CONDUIT SIZE	LOCATION
01	TELEPHONE SYSTEM (RJ-11)	4PAIR CAT-5c	25mmØ	FLOOR
02	LIGHT POINT / FAN POINT	3x1.5mm ² 1CORE	25mmØ	CEILING
03	5A LIGHT PLUG	3x2.5mm ² 1CORE	25mmØ	FLOOR
04	SPLIT UNIT 2 TON	2x6mm ² +1x4mm ²	25mmØ	CEILING
05	SPLIT UNIT 1.5 TON	2x4mm ² +1x2.5mm ²	25mmØ	CEILING
06	SPLIT UNIT 1 TON	2x4mm ² +1x2.5mm ²	25mmØ	CEILING
07	15A POWER SWITCH SOCKET	2x4mm ² +1x2.5mm ²	25mmØ	FLOOR
08	LIGHT CKT D.B TO SWITCH BOX	3x2.5mm ² 1CORE	25mmØ	CEILING
09	FIRE ALARM SYSTEM	1.5SQMM 2CORE FIRE PROOF CABLE	25mmØ	CEILING

Architects

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ACADEMIC BLOCK

Drawing Title

EARTH PIT DETAIL

Approved By

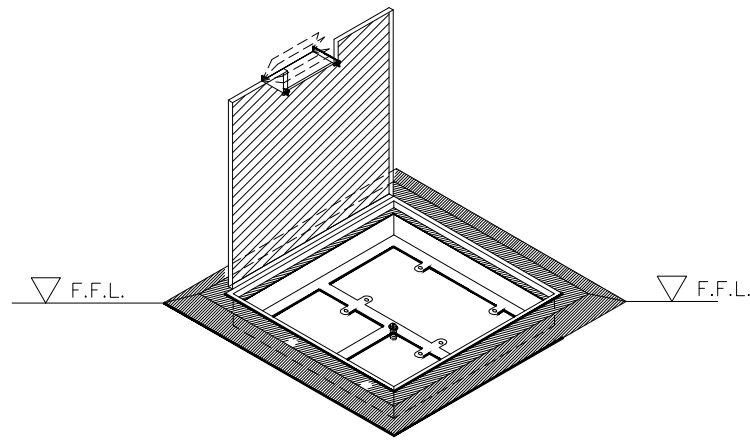
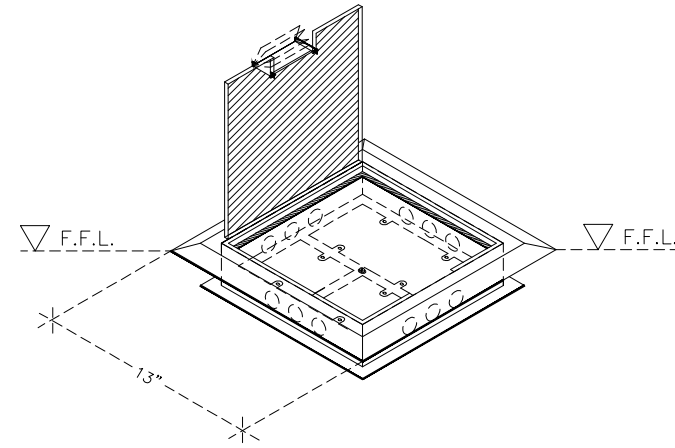
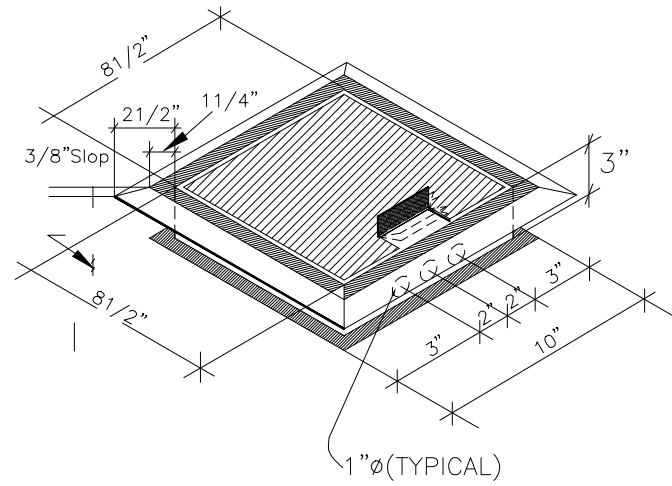
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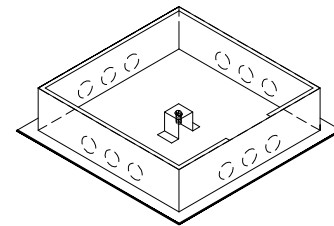
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Date 11-01-2019

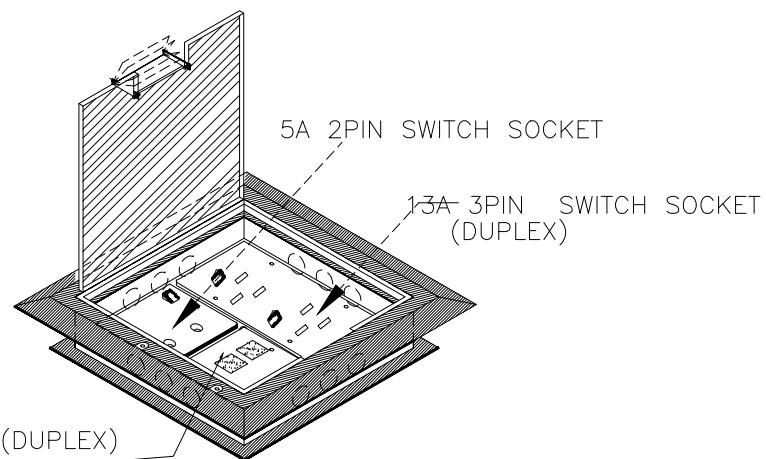
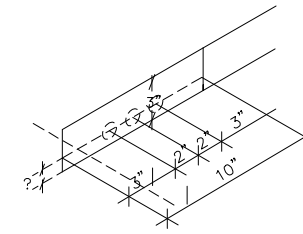
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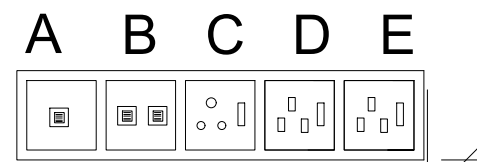
UNDER FLOOR



FLOOR OUTLETS BOX
N.T.S



RJ-45 CONNECTOR (DUPLEX)
(TELEPHONE & DATA OUTLET)



DETAIL-A 12"

F.F.L

- A- TELEPHONE OUTLET RJ-11
- B- COMPUTER DATA OUTLET RJ-45
- C- 5A S.P SWITCH SOCKET (3 PIN) NORMAL POWER
- D- 13A S.P FLAT PIN SWITCH SOCKET (UPS POWER)

SIBA

**SIBA COMMUNITY COLLEGE
JACOBABAD
NAUSHERO FEROZE**

Architects

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EMAIL engineer_fareed@yahoo.com

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ISSUED FOR TENDER

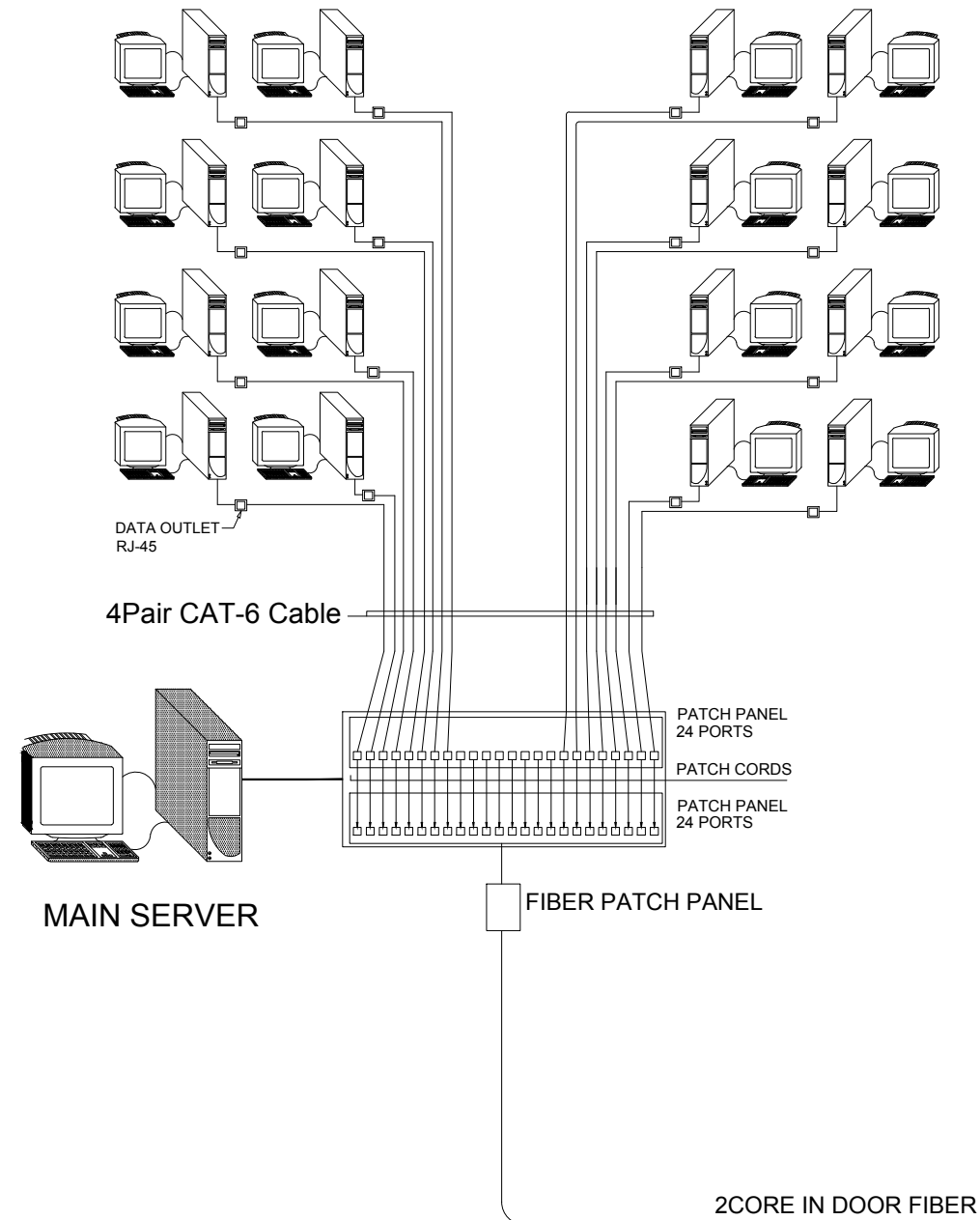
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Drawing Title

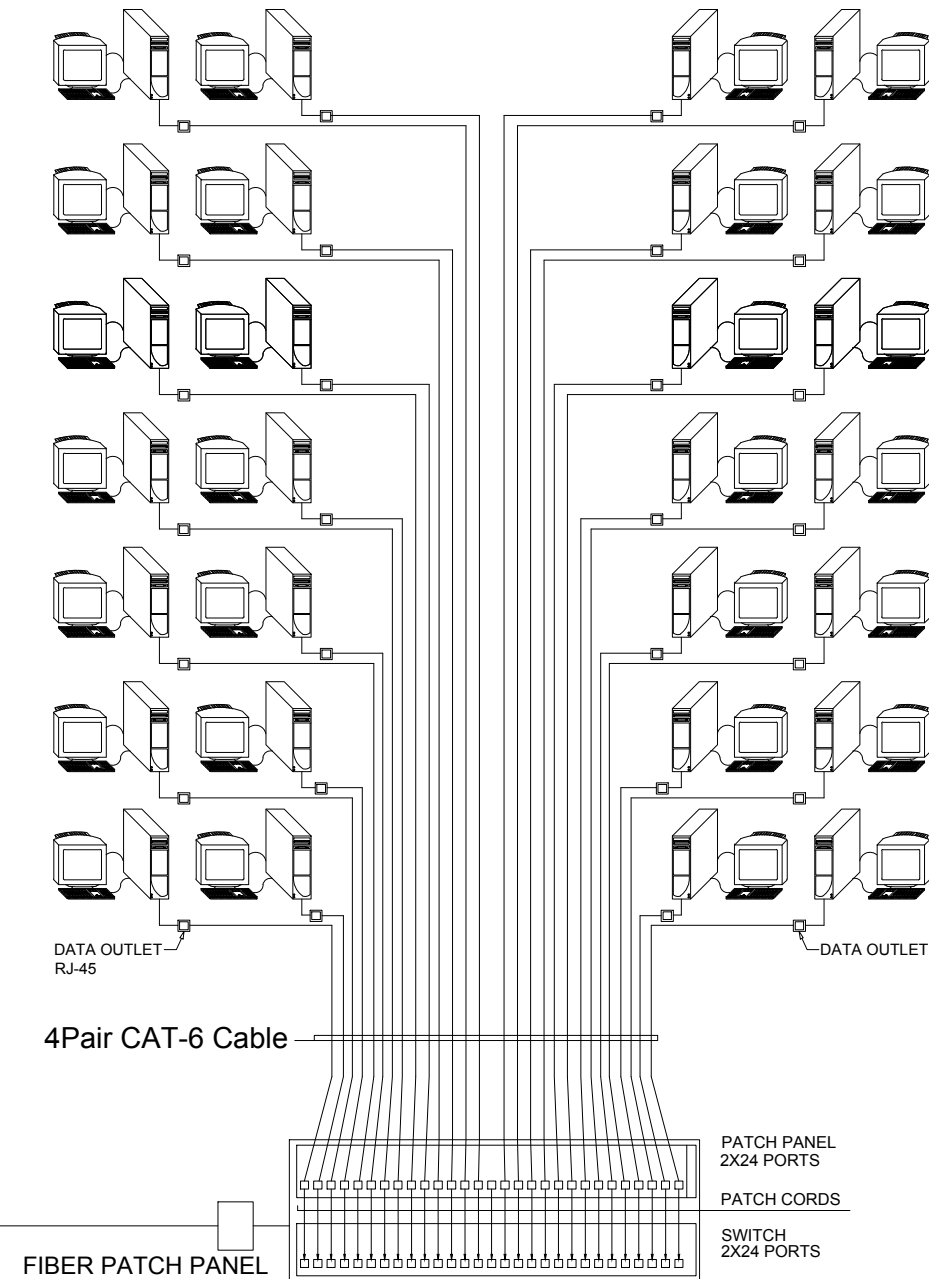
DETAIL-A

Approved By	
Checked By	Engr.Fareed ul Haq
Drawn By	Salman Khan
Scale	NTS
Date	11-01-2019
Drawing #	E-04

16Nos. COMPUTERS GORUND FLOOR



28Nos. COMPUTERS FIRST FLOOR



SIBA

**SIBA COMMUNITY COLLEGE
JACOBABAD
NAUSHERO FERZE**

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

SINGLE LINE DIAGRAM FOR DATA SYSTEM

Approved By

Checked By Engr.Fareed ul Haq

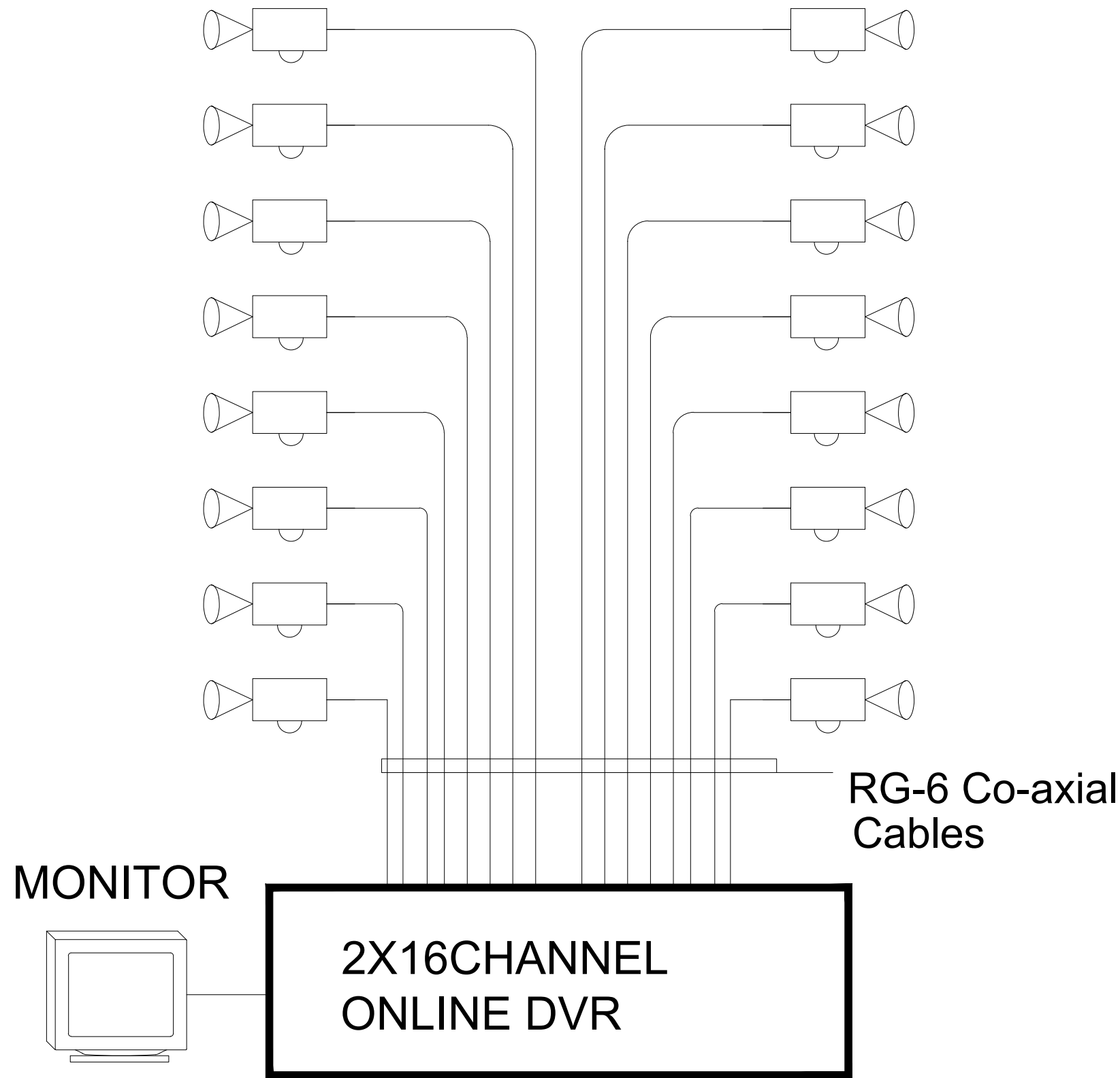
Drawn By Salman Khan

Scale NTS

Date 11-01-2019

Drawing # E-05

18Nos. CAMERA



SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

**SINGLE LINE DIAGRAM FOR
CC-TV SYSTEM**

Approved By

Checked By Engr.Fareed ul Haq

Drawn By Salman Khan

Scale NTS

Date 11-01-2019

Drawing # E-06

SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

**GROUND FLOOR LIGHTING
LAYOUT**

Approved By

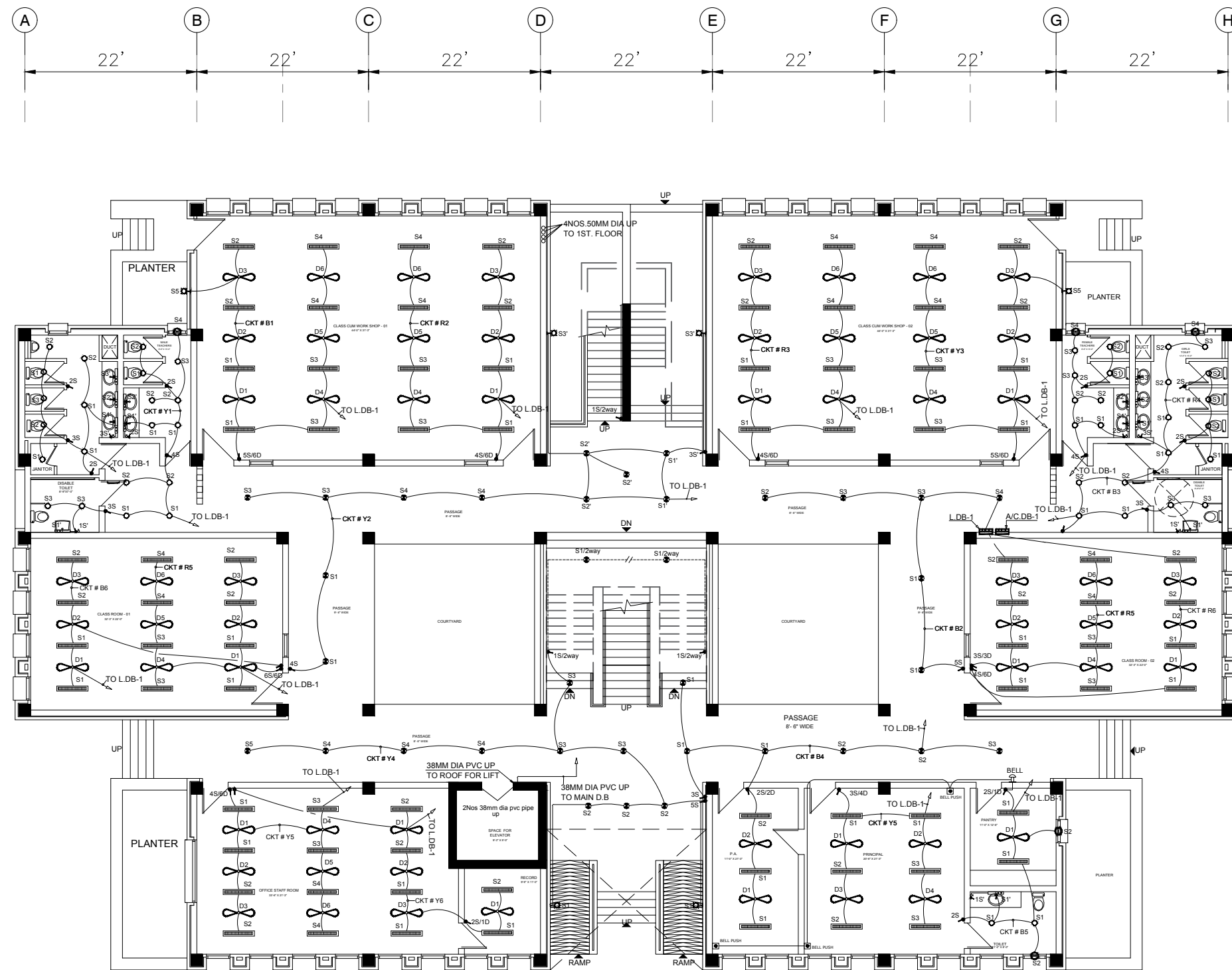
Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale 1/8" = 1'-0"

Date 11-01-2019

Drawing # E-07



**GROUND FLOOR LIGHTING
LAYOUT**

04
A-00

SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

**GROUND FLOOR POWER, TELEPHONE, DATA,
& SPLIT UNIT SYSTEM LAYOUT**

Approved By

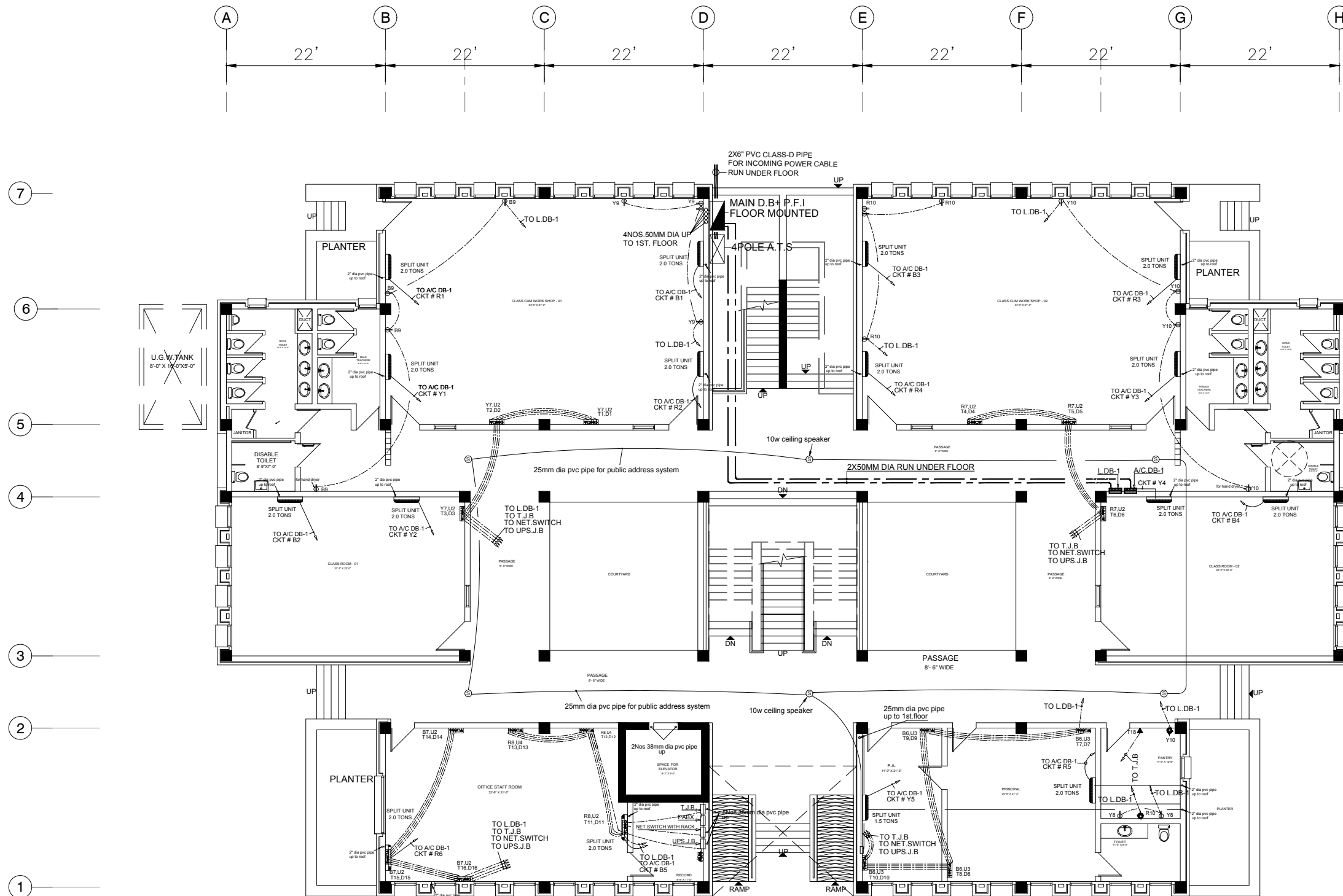
Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale 1/8" = 1'-0"

Date 11-01-2019

Drawing # E-08



**GROUND FLOOR POWER, TELEPHONE, DATA,
& SPLIT UNIT SYSTEM LAYOUT**

SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

GROUND FLOOR FIRE ALARM & CC-TV SYSTEM LAYOUT

Approved By

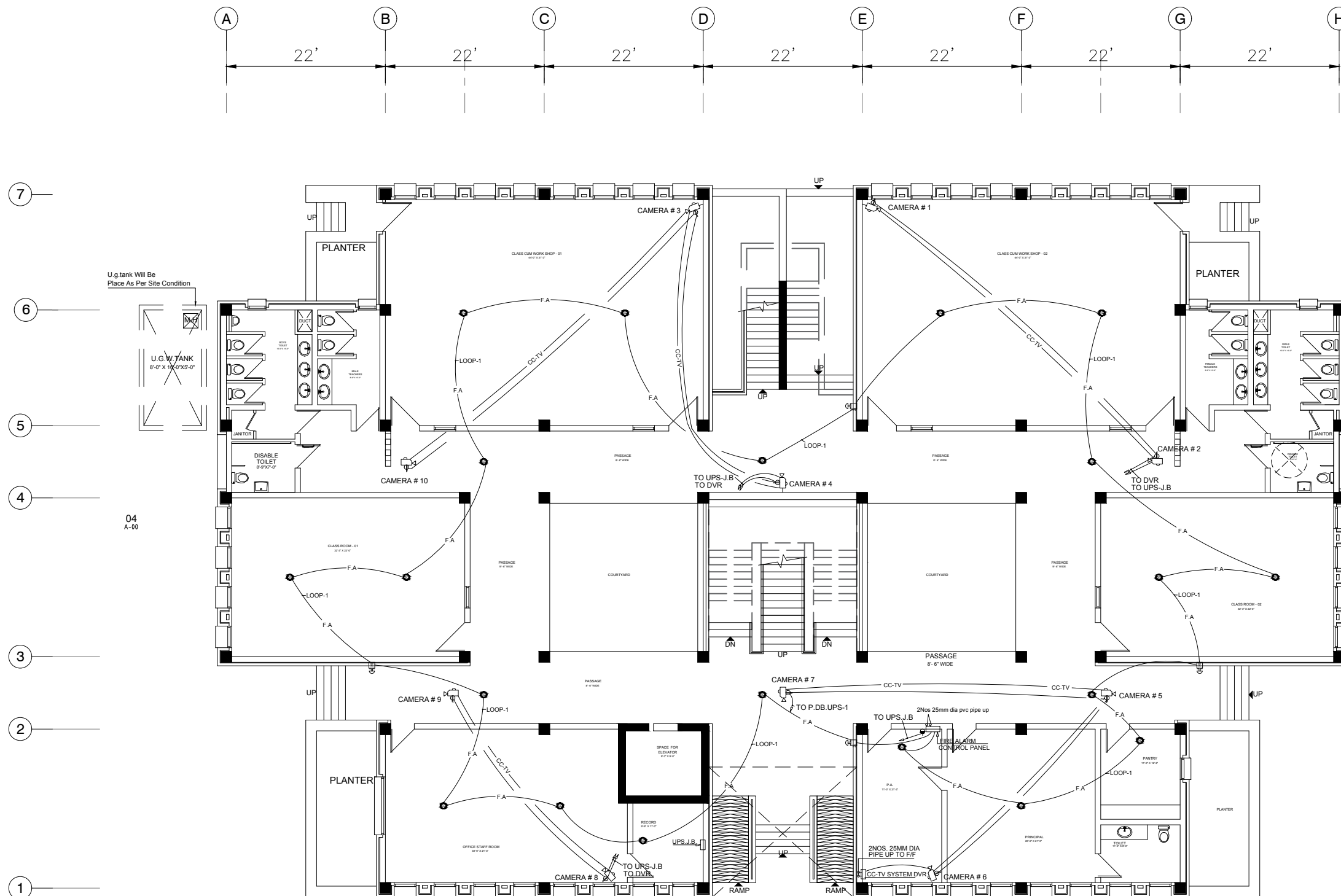
Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale 1/8" = 1'-0"

Date 11-01-2019

Drawing # E-09



GROUND FLOOR FIRE ALARM & CC-TV SYSTEM LAYOUT

SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

**FIRST FLOOR LIGHTING
LAYOUT**

Approved By

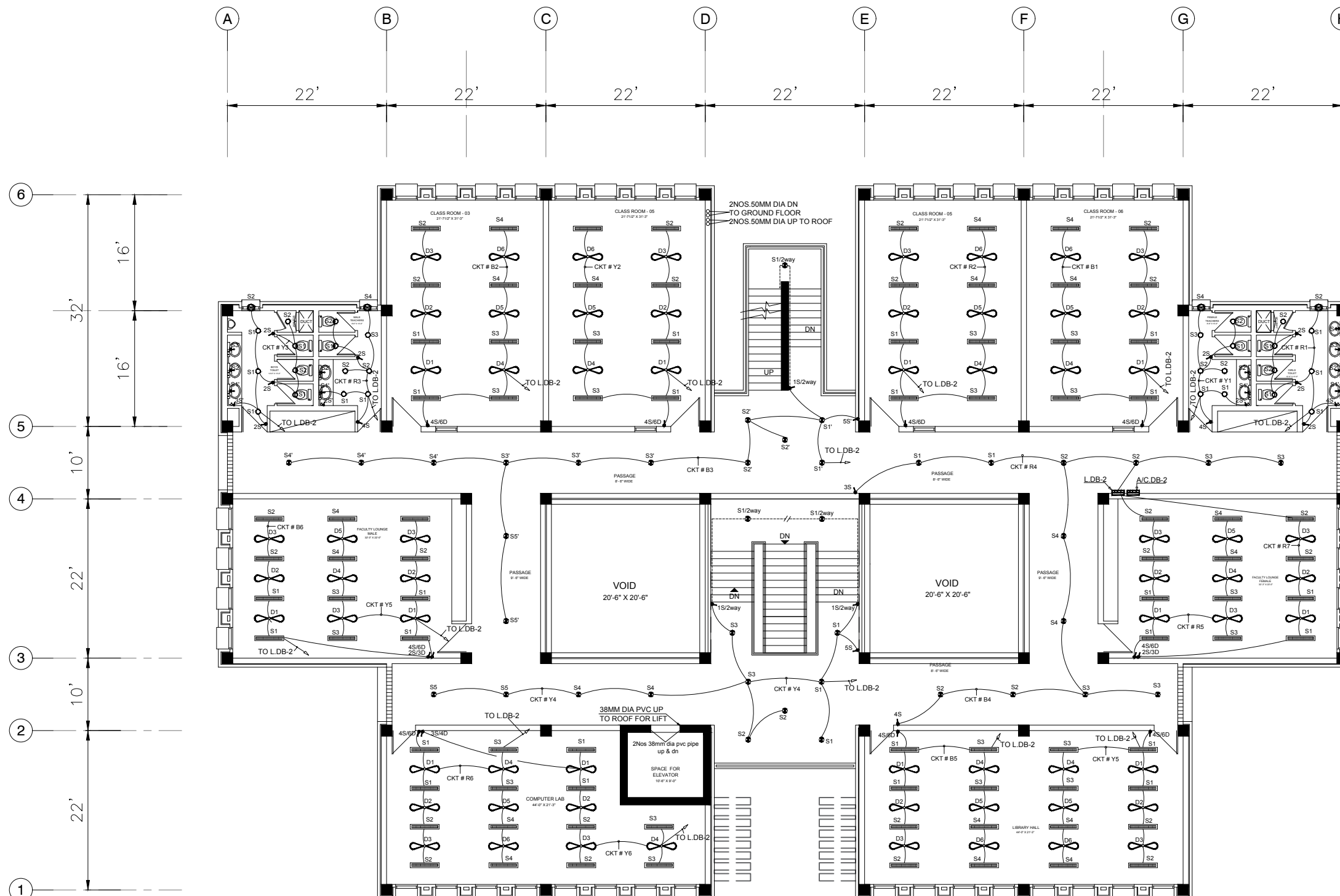
Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale 1/8" = 1'-0"

Date 11-01-2019

Drawing # E-10



**FIRST FLOOR LIGHTING
LAYOUT**

SIBA

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

FIRST FLOOR POWER, TELEPHONE, DATA, & SPLIT UNIT SYSTEM LAYOUT

Approved By

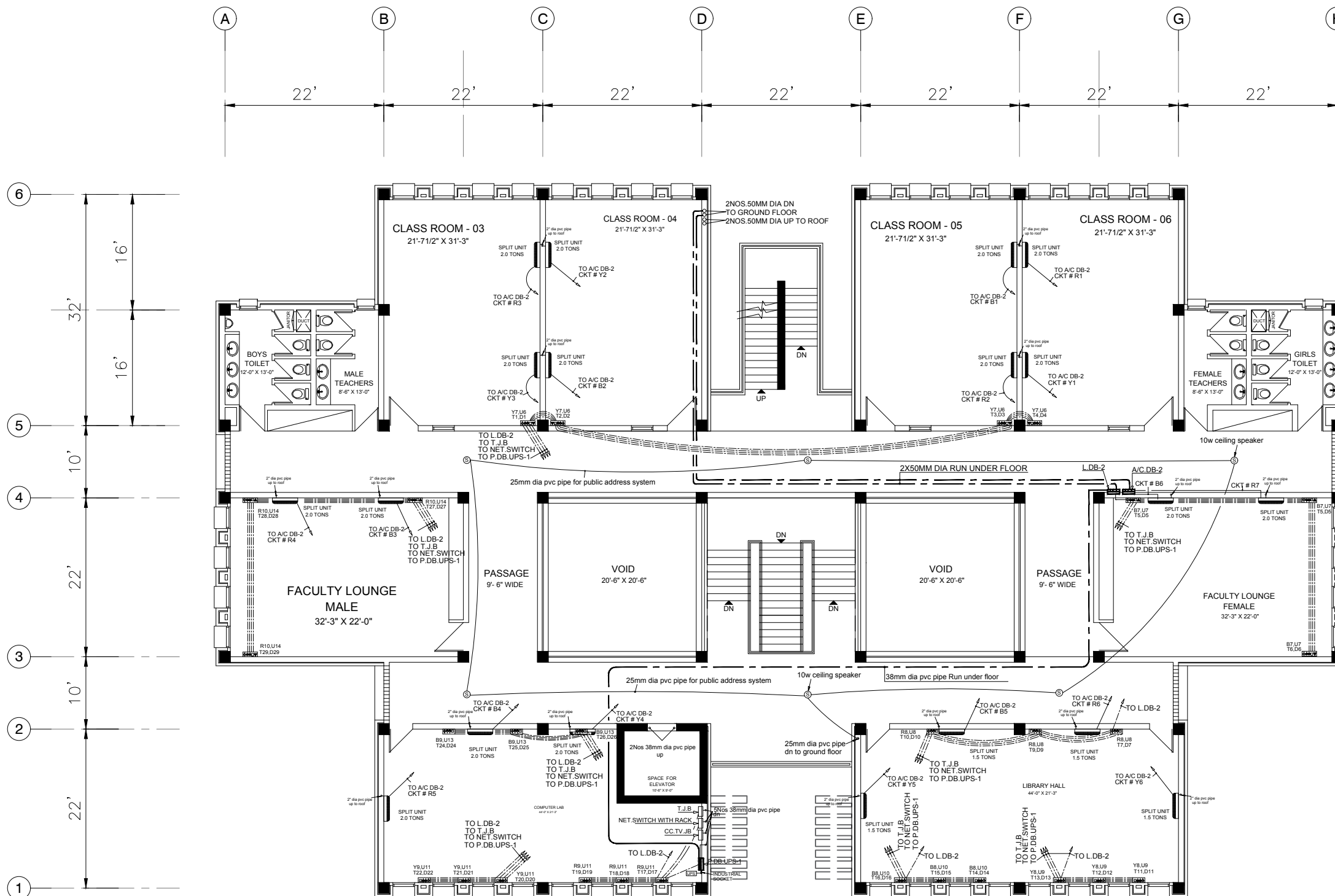
Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale 1/8" = 1'-0"

Date 11-01-2019

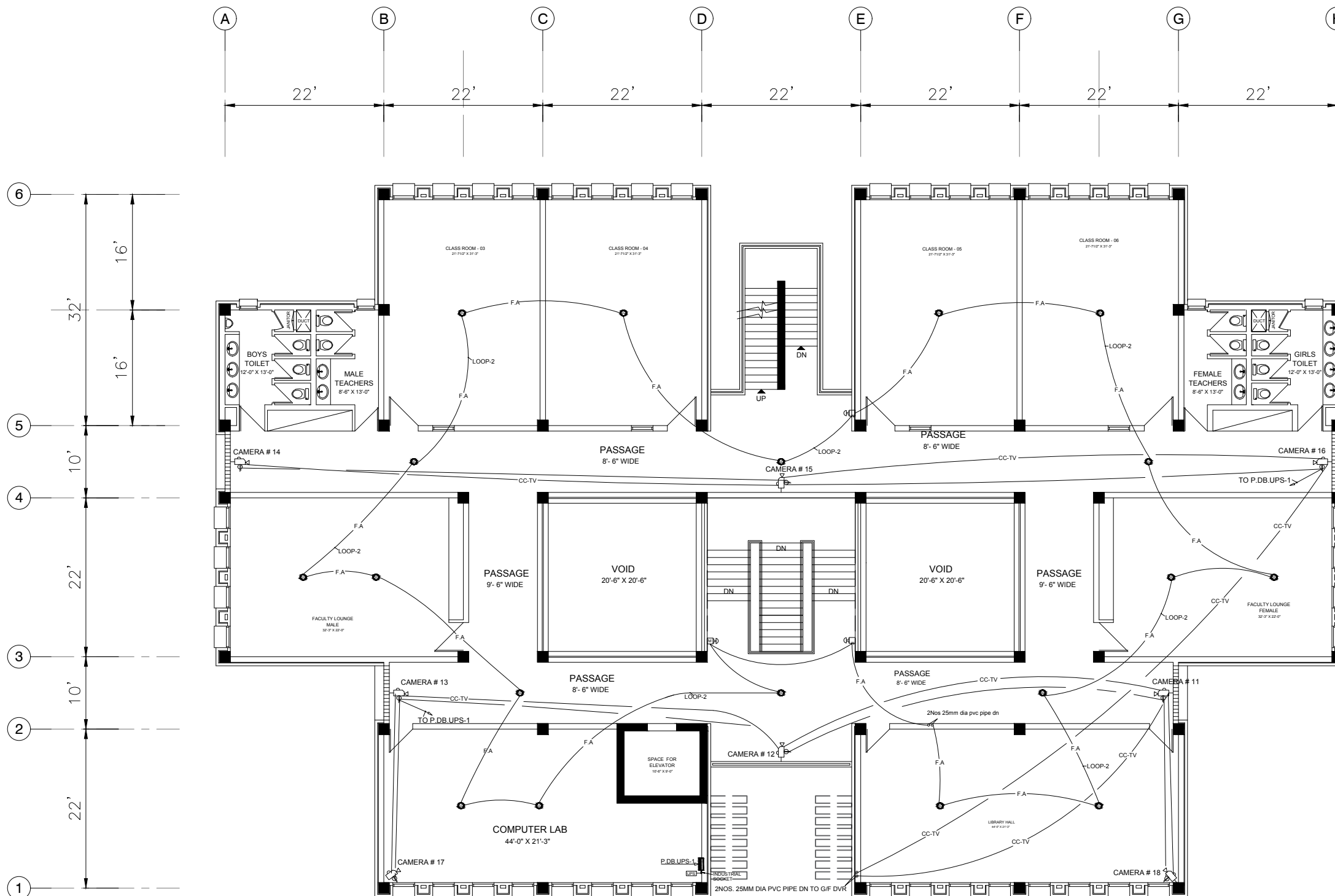
Drawing # E-11



FIRST FLOOR POWER, TELEPHONE, DATA, & SPLIT UNIT SYSTEM LAYOUT

SIBA

**SIBA COMMUNITY COLLEGE
JACOBABAD
NAUSHERO FERZE**



**FIRST FLOOR FIRE ALARM &
CC-TV SYSTEM LAYOUT**

Architects

Habib Fida Ali

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

**FIRST FLOOR FIRE ALARM &
CC-TV SYSTEM LAYOUT**

Approved By

Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale 1/8" = 1'-0"

Date 11-01-2019

Drawing # E-12

SIBA

**SIBA COMMUNITY COLLEGE
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NAUSHERO FEROZE**

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

ROOF ELECTRICAL LAYOUT

Approved By

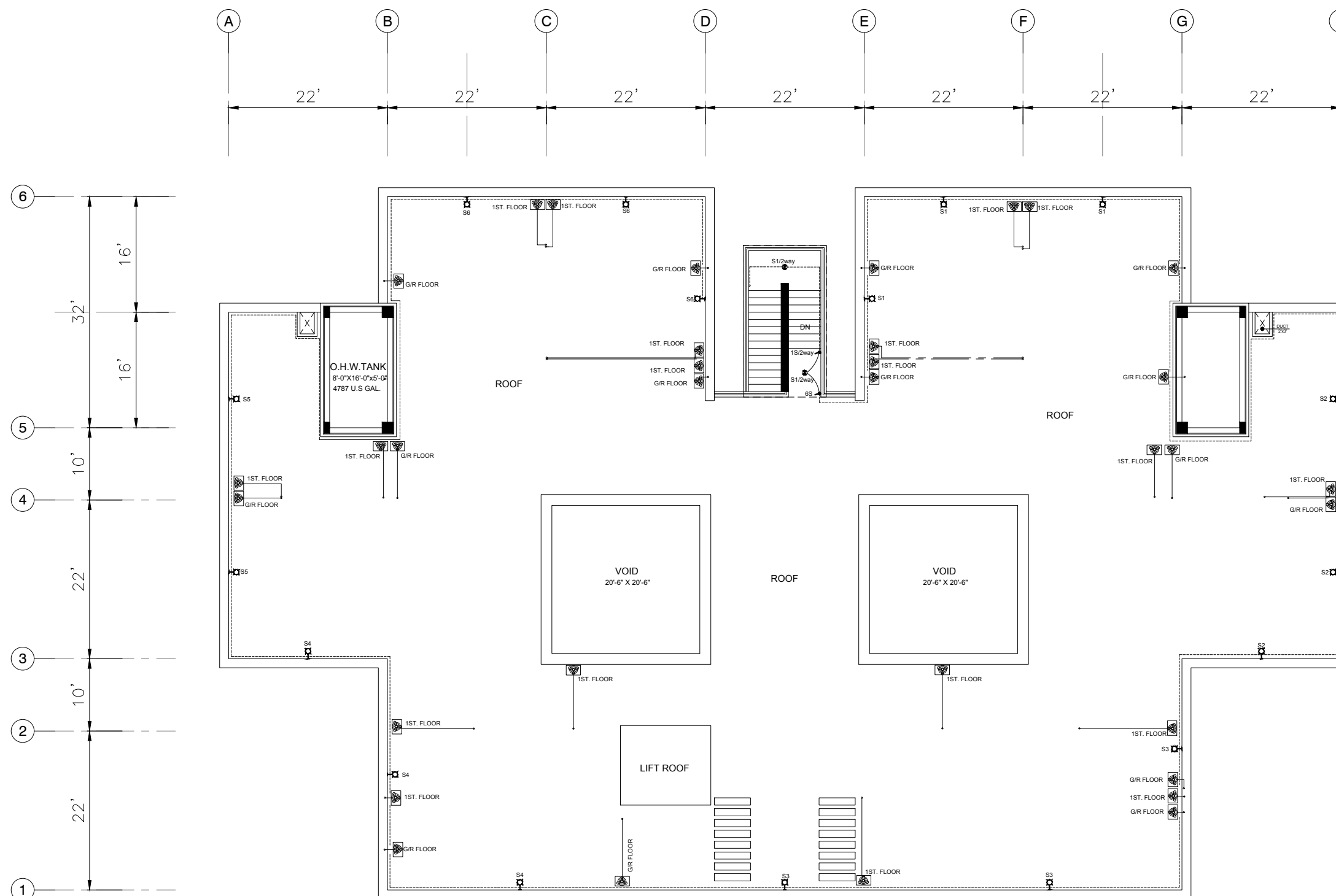
Checked By Engr. Fareed ul Haq

Drawn By Salman Khan

Scale NTS

Date 11-01-2019

Drawing # E-13



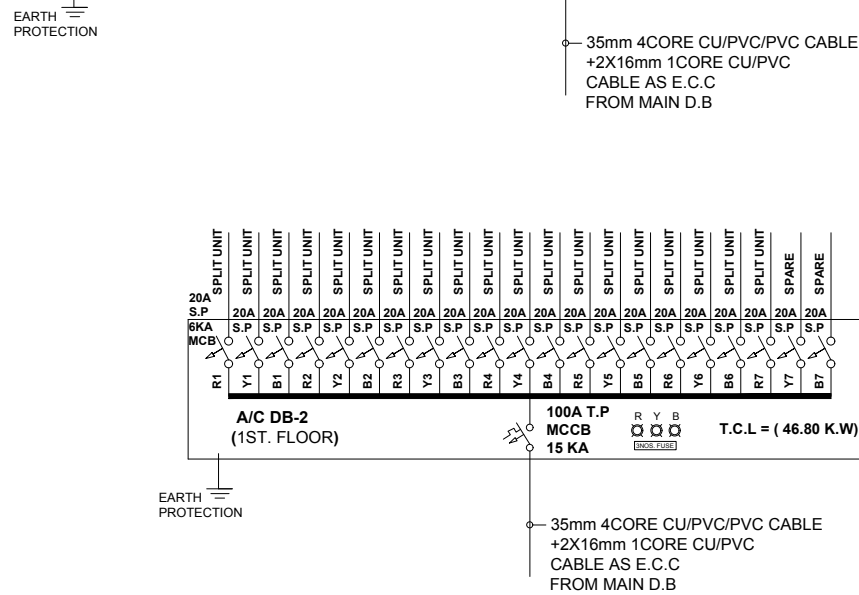
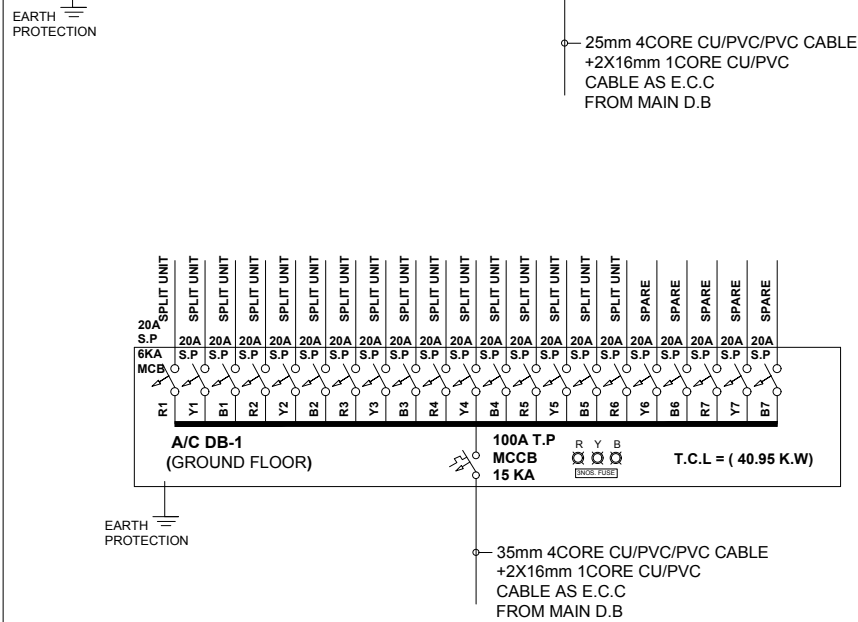
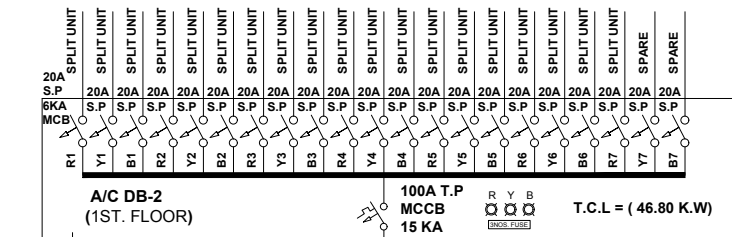
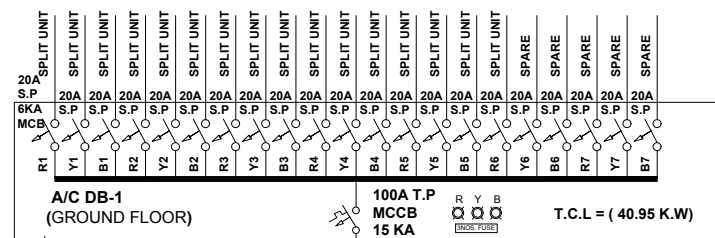
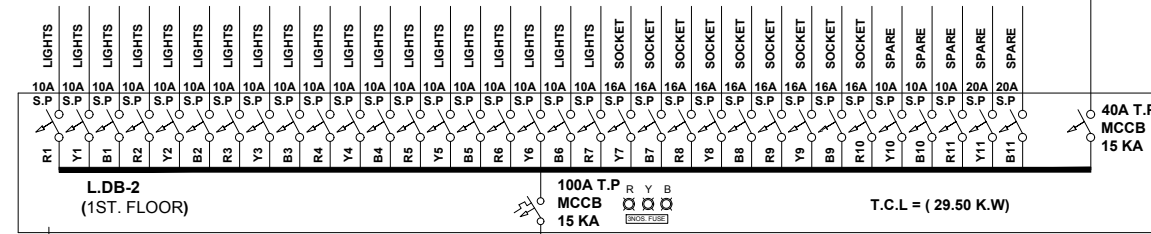
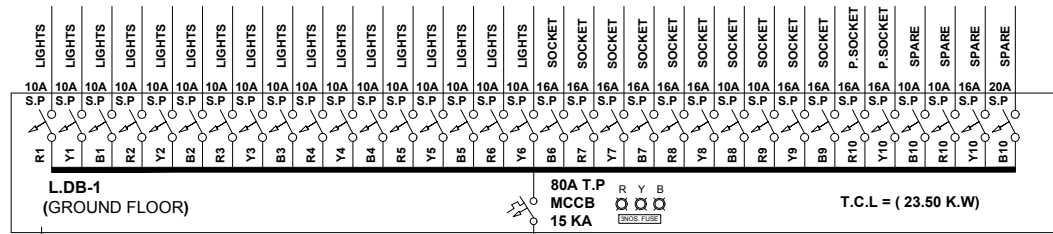
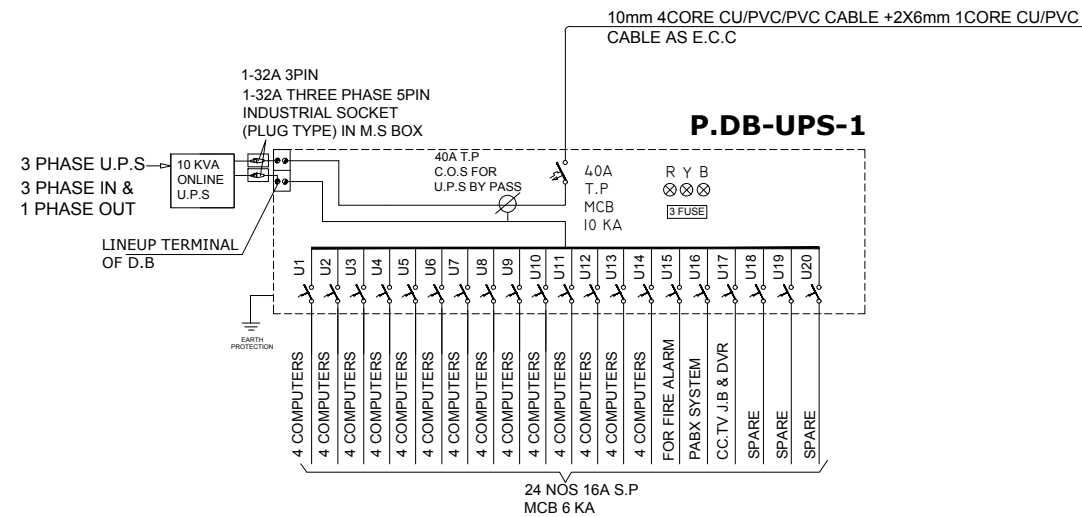
ROOF ELECTRICAL LAYOUT

Recommended manufacturers

MS Sheet Metal 16 Swg. (approved make)
 Cable Pakistan Cables Make
 Color RAL 7032 Powder Coat-Standard Color
 ALL S.P MCB 6KA
 ALL T.P MCCB 15 K.A
 ALL 4P MCCB 15 KA
 ALL TP MCB 10KA

NOTES:
 PLEASE PROVIDE SHOP DRAWINGS
 BEFORE CONSTRUCTION OF
 D.Bs FOR "CONSULTANT APPROVAL"

NOTES
 RECOMMENDED CONNECTION FROM WAPDA 140.00 K.W



(All material to be selected from approved manufacturer's list)

SIBA

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 JACOBABAD
 NAUSHERO FEROZE

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ISSUED FOR TENDER

ACADEMIC BLOCK

Drawing Title

SINGLE LINE DIAGRAM FOR L.DBs

Approved By

Checked By Engr. Fareed ul Haq

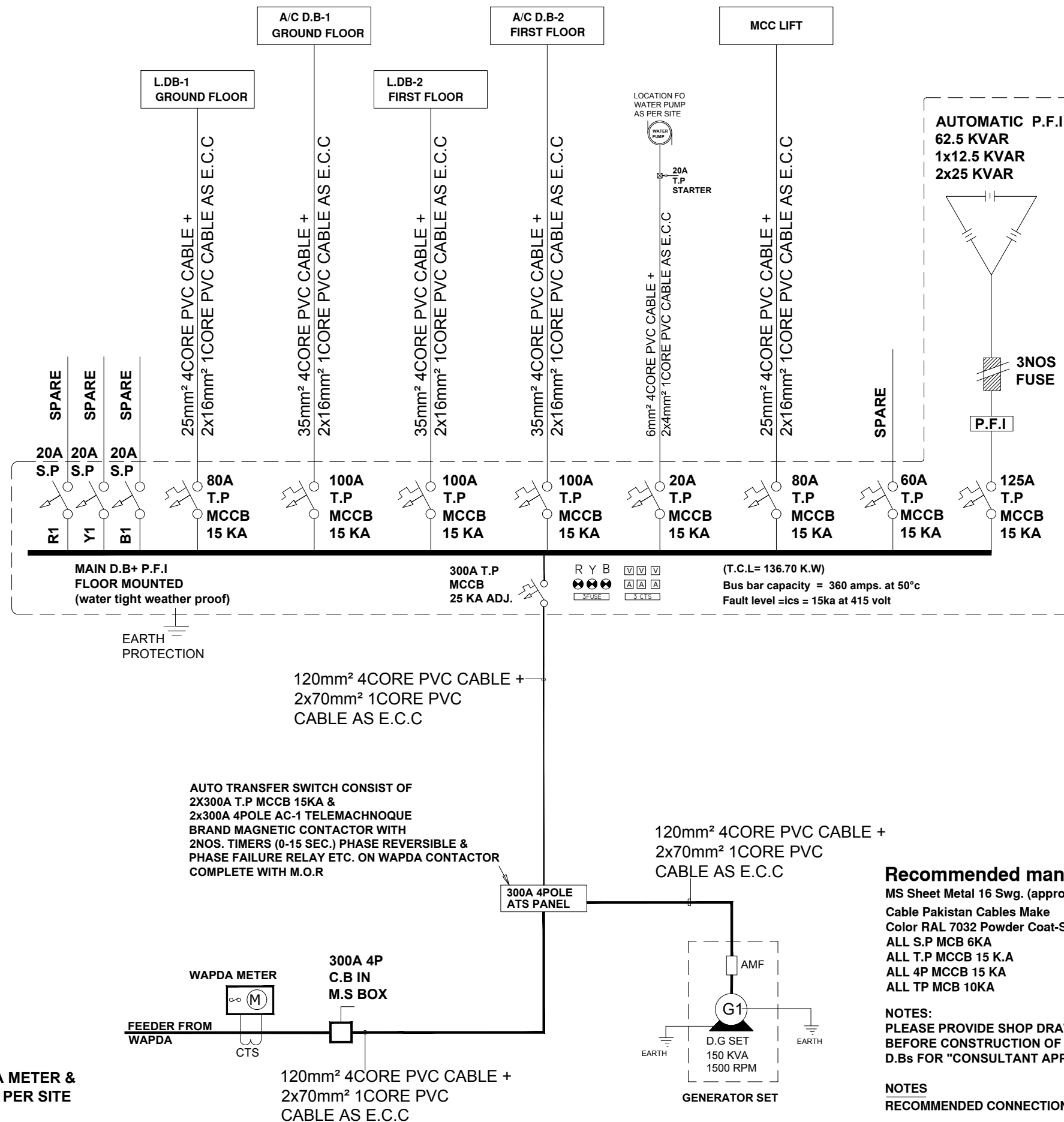
Drawn By S.KHAN

Scale NTS

Date 11-01-2019

Drawing # E-14

(All material to be selected from approved manufacturer's list)



NOTES.
LOCATION OF WAPDA METER &
GENERATOR SET. AS PER SITE

Recommended manufacturers

- MS Sheet Metal 16 Swg. (approved make)
- Cable Pakistan Cables Make
- Color RAL 7032 Powder Coat-Standard Color
- ALL S.P MCB 6KA
- ALL T.P MCCB 15 K.A
- ALL 4P MCCB 15 KA
- ALL TP MCB 10KA

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D.Bs FOR "CONSULTANT APPROVAL"

NOTES
RECOMMENDED CONNECTION FROM WAPDA 140.00 K.W

SIBA

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ISSUED FOR **TENDER**

ACADEMIC BLOCK

Drawing Title

SINGLE LINE DIAGRAM FOR MAIN D.B +P.F.I

Approved By	
Checked By	Engr.Fareed ul Haq
Drawn By	S.KHAN
Scale	NTS
Date	11-01-2019
Drawing #	E-15

SIBA COMMUNITY COLLEGE

JACOBABAD NAUSHERO FEROZE

Electrical, Telephone, CC-TV, Fire Alarm &
Computer Data Networking System Works

TENDER DRAWINGS

Architect

HABIB FIDA ALI

▪ ARCHITECTURE INTERIORS
▪ URBAN DESIGN PROJECT MANAGEMENT
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PHONE NO. 5661683, 5661720,

Electrical Consultant



Design & Development Engineering Associates

Electrical & Mechanical Consultant
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ELECTRICAL DRAWINGS

FOR TENDER

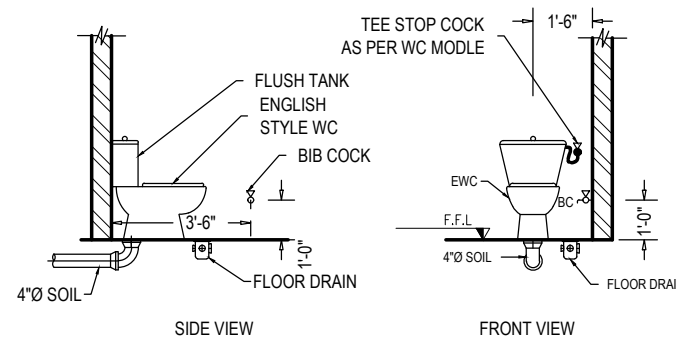
SEPTEMBER 2021

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		PLUMBING SYSTEM	
2	PS-01	LEGEND & MISCELLANEOUS DETAILS	N.T.S
		PLUMBING SYSTEM	
		DRAINAGE SYSTEM	
3	PS-02	GROUND FLOOR PLAN	1/16"
		DRAINAGE SYSTEM	
4	PS-03	FIRST FLOOR PLAN	1/16"
		DRAINAGE SYSTEM	
5	PS-04	ROOF PLAN	1/16"
		DRAINAGE SYSTEM	
6	PS-05	ENLARGE DETAILS	1/4"
		DRAINAGE SYSTEM	
		WATER SUPPLY SYSTEM	
7	PS-06	GROUND FLOOR PLAN	1/16"
		WATER SUPPLY SYSTEM	
8	PS-07	FIRST FLOOR PLAN	1/16"
		WATER SUPPLY SYSTEM	
9	PS-08	ROOF PLAN	1/16"
		WATER SUPPLY SYSTEM	
10	PS-09	ENLARGE DETAILS	1/4"
		WATER SUPPLY SYSTEM	

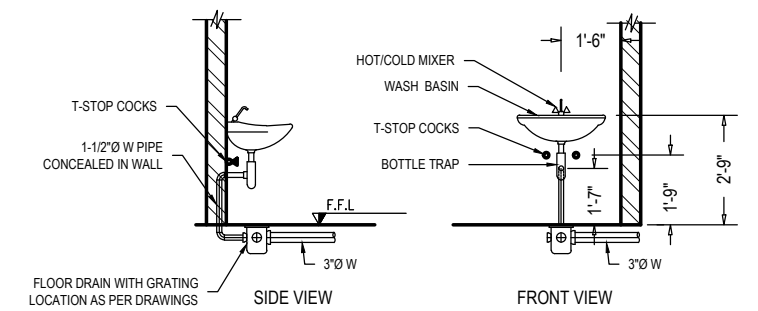
REV.	DATE	
Issued For		ADVANCE COPY
SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
DRAWING REGISTER PLUMBING SYSTEM		
ARCHITECT :	HABIB FIDA ALI Architects 4-C/1, Feroz Khan Road Karachi Qurbani Phone 5651683, 5651684, 5651720	Scale N.T.S
STRUCTURE ENGINEER :	LOYA ASSOCIATES CONSULTING ENGINEERS & PROJECT PLANNERS 185-C BLOCK-2, P.O. SOCIETY OFF. SHARBA FADAL/SHARBAH-E-QUADEEN, KARACHI-75400, PAKISTAN	Date JAN, 2019
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates Electrical & Mechanical Consultant Sul No. 404/182 4th floor Hameed Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL # 021-2259021 EMAIL: enjineer_ahmed@yahoo.com	Drawn F.P
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Checked N.K
		Drawing No PS-00

LEGEND

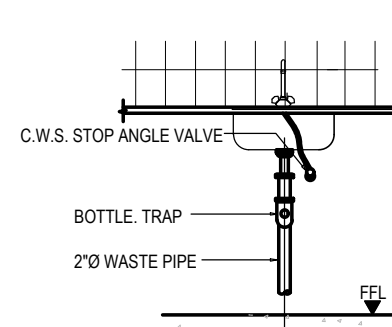
SYMBOL	DESCRIPTION	REMARKS
	SS SOIL WATER PIPE	uPVC PIPES
	WS WASTE WATER PIPE	uPVC PIPES
	VS VENT PIPE	uPVC PIPES
	SW SEWERAGE PIPE	REINFORCED CEMENT CONCRETE CLASS "A" PIPE
	NG NATURAL GAS	MEDIUM QUALITY G.I. PIPE
	RWG RAIN WATER GRATING	uPVC MOULDED DOME TYPE GRATING
	RWP RAIN WATER PIPE DOWN	uPVC PIPES
	EWC ENGLISH STYLE WATER CLOSET	APPROVED MAKE
	WB WASH BASIN	APPROVED MAKE
	WB-V VANITY TYPE WASH BASIN	APPROVED MAKE
	SK STAINLESS STEEL SINK	APPROVED MAKE
	FD FLOOR DRAIN	PVC P-TRAP WITH GRATING
	GT GULLY TRAP	PVC GULLY TRAP WITH COVER
	MH MANHOLE	WITH ROUNDED SHAPE CI COVER
	CW COLD WATER SUPPLY	PPR-C PIPES FOR INTERNAL/GI MEDIUM QUALITY FOR EXTERNAL INSTALLATION
	HW HOT WATER SUPPLY	PPR-C ALUMINUM CLADING PIPES
	HWR HOT WATER RETURN	PPR-C ALUMINUM CLADING PIPES
	BC/TB BIB COCK/TOILET SHOWER WITH FLEXIBLE CHAIN AND SHOWER HEAD HOSE BIB FOR IRRIGATION WATER	3/4"Ø BRASS BODY HOSE BIB
	GV GATE VALVE	APPROVED MAKE
	CV CHECK VALVE	APPROVED MAKE
	GV GLOBE VALVE	APPROVED MAKE
	BV BALL VALVE	APPROVED MAKE
	FV FLOAT VALVE	APPROVED MAKE
	FOV FOOT VALVE	APPROVED MAKE
	T-STOP FOR COCK	APPROVED MAKE
	HB HOSE BIB IRRIGATION WATER SUPPLY	APPROVED MAKE
	CWP CENTRIFUGAL WATER PUMP	AS PER PUMP SCHEDULE
	FCO FLOOR CLEAN OUT EXTENDED TO F.F. LEVEL	



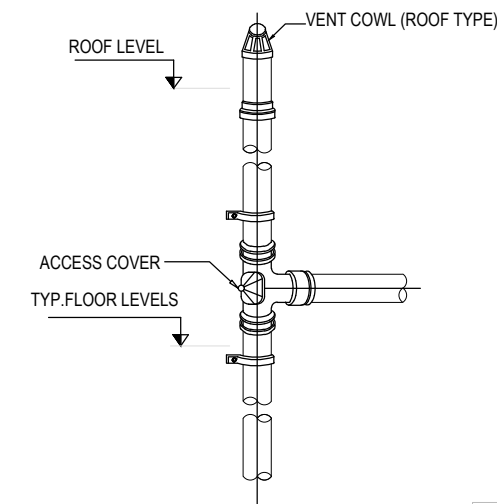
STANDARD FIXING DIMENSIONS OF ENGLISH STYLE WATER CLOSET, (IWC)



STANDARD FIXING DIMENSION OF WASH BASIN WITH BOTTLE TRAP



DETAIL OF KITCHAN SINK



TYPICAL VERTICAL STACK DRAINAGE PIPE CONNECTION

PPR-C PIPE SIZES

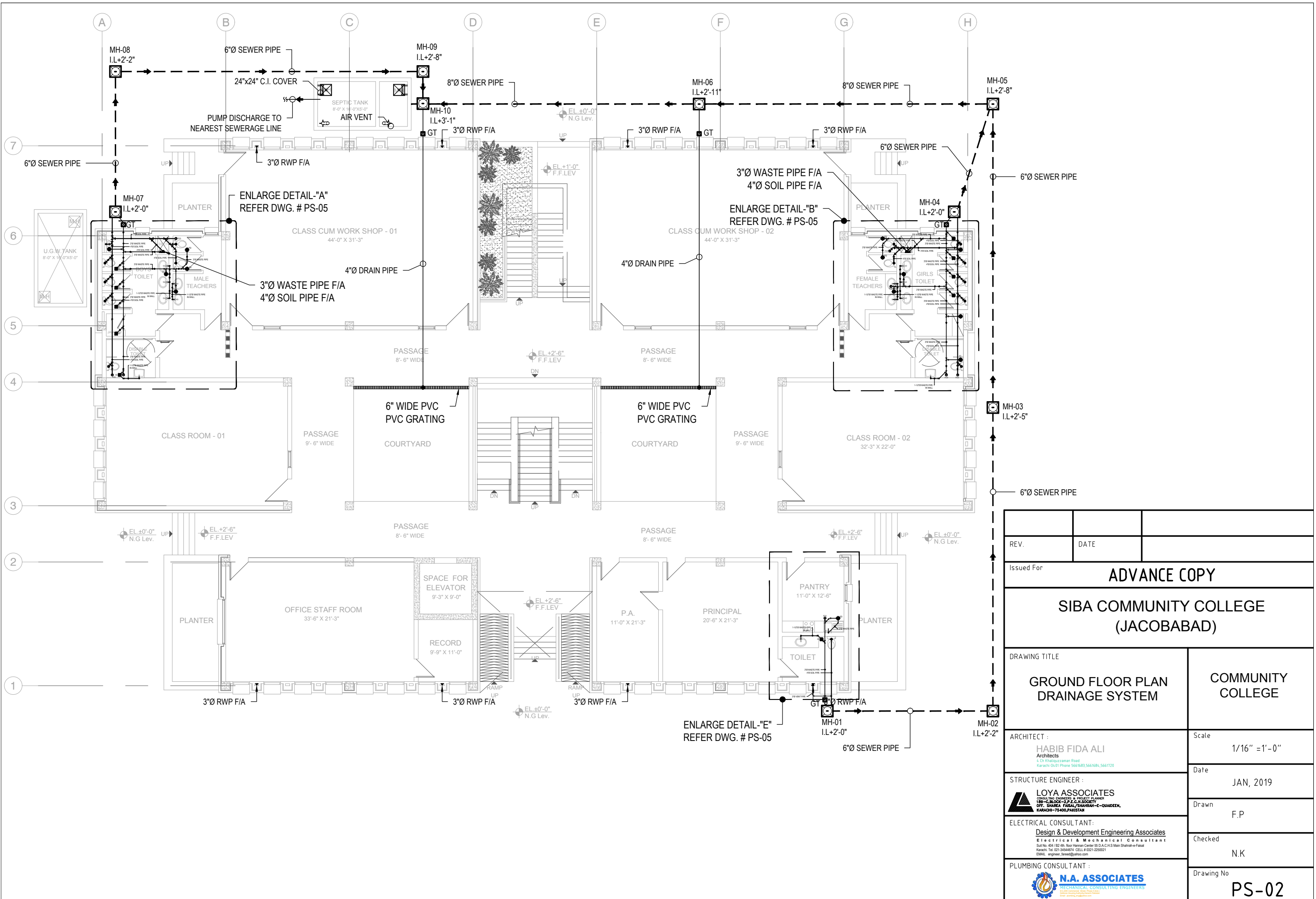
INTERNAL DIA	EXTERNAL DIA
1/2"	20 MM
3/4"	25 MM
1"	32 MM
1-1/4"	40 MM
1-1/2"	50 MM
2"	65 MM
2-1/2"	75 MM
3"	90 MM

PIPE DIA SHOWN ON DRAWING ARE OUTER DIA

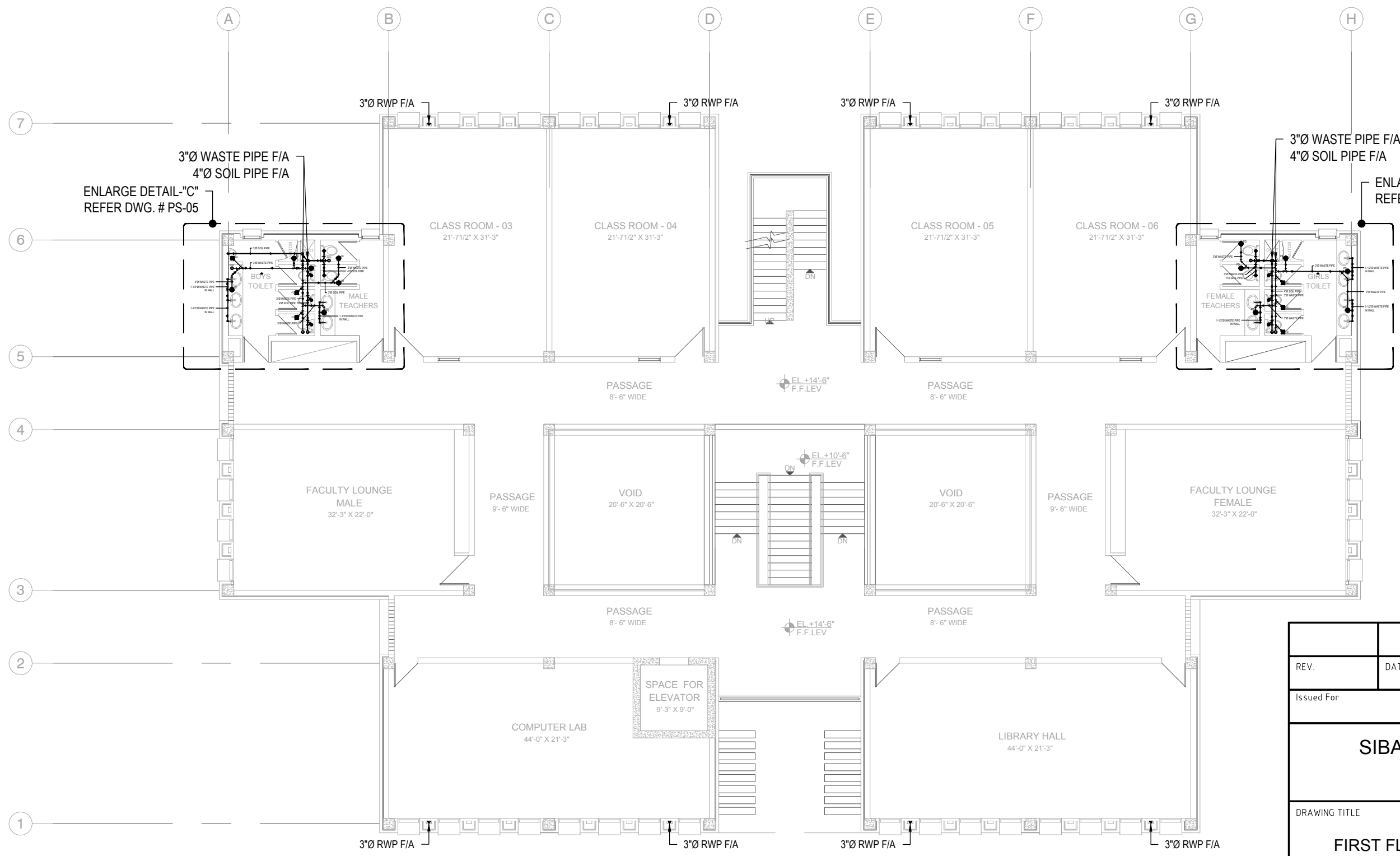
RECOMMENDED U-PVC PIPE SLOPES

PIPE SIZE	SLOPE RATIO
1-1/2"Ø TO 2"Ø	1:20, 1:30
3"Ø	1:40, 1:60
4"Ø	1:100
6"Ø	1:150

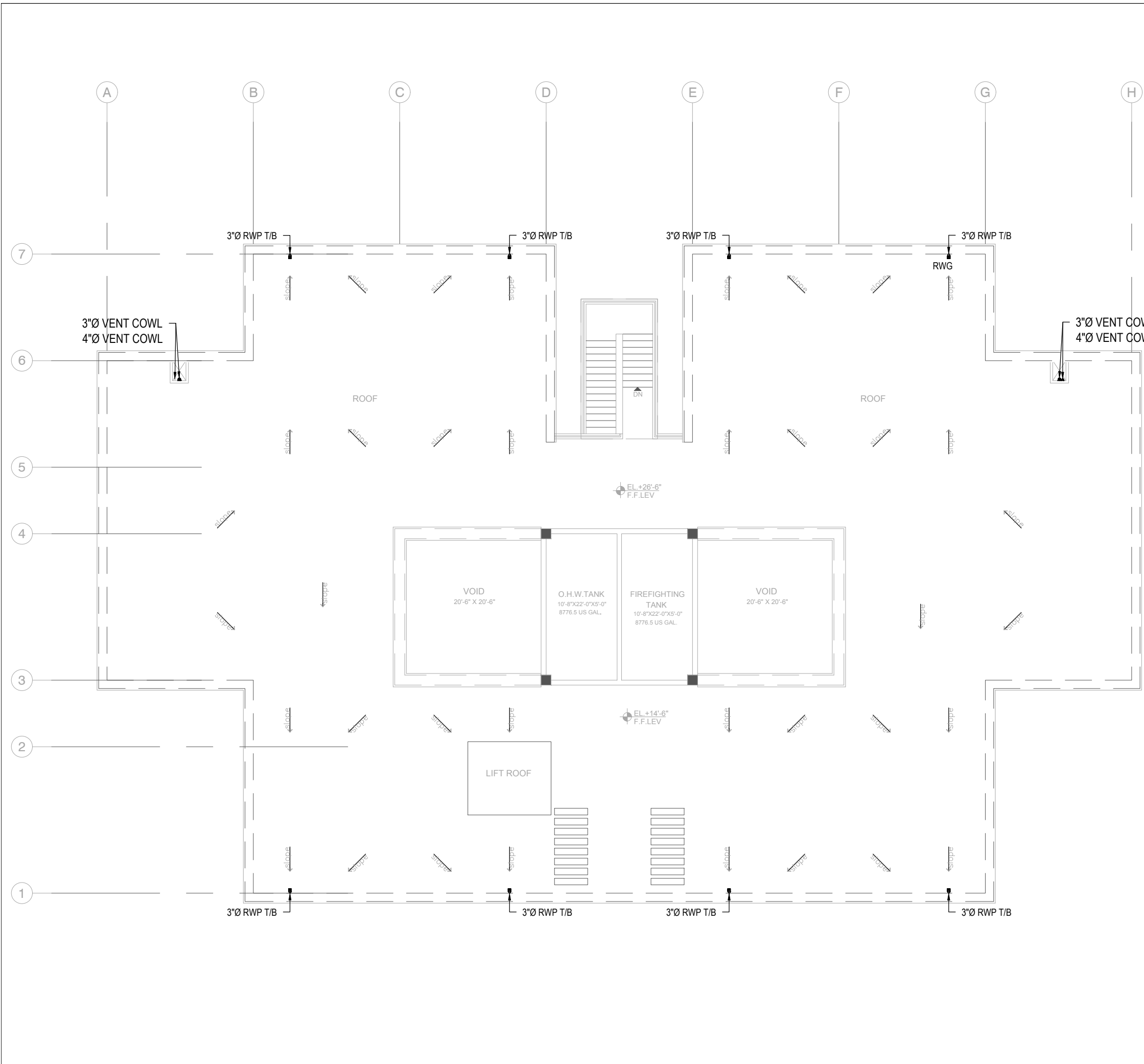
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SIBA COMMUNITY COLLEGE (JACOBABAD)	
DRAWING TITLE	
LEGENDS & MISCELLANEOUS DETAILS PLUMBING SYSTEM	
COMMUNITY COLLEGE	
ARCHITECT :	Scale
HABIB FIDA ALI Architects 4-C/1, Feroz Khan Road Karachi Qulbi Phone 5651683, 5651728	N.T.S
STRUCTURE ENGINEER :	Date
LOYA ASSOCIATES CONSULTING ENGINEERS & PROJECT MANAGER 180-C-BLOCK-2, P.O. H.SOCIETY OFF: SHARBA FADAL/SHARBAH-E-QUADKHE, KARACHI-75400, PAKISTAN	JAN, 2019
ELECTRICAL CONSULTANT:	Drawn
Design & Development Engineering Associates Electrical & Mechanical Consultant Sult No. 404/182 4th floor Heman Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL# 021-2259021 EMAIL: engin@designee.com	F.P
PLUMBING CONSULTANT :	Checked
N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	N.K
	Drawing No
	PS-01





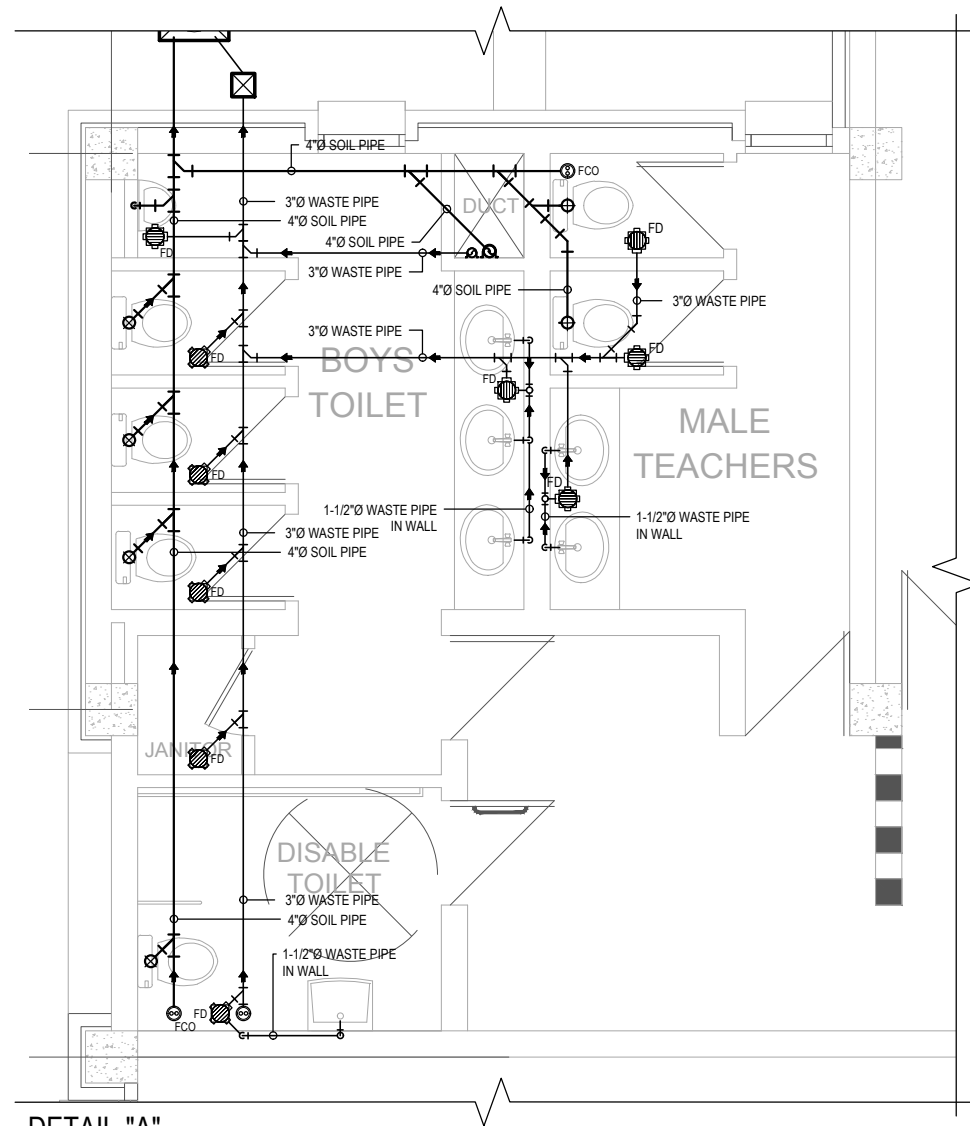
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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
GROUND FLOOR PLAN DRAINAGE SYSTEM		
ARCHITECT :	HABIB FIDA ALI Architects 4-D, Feroz Road Karachi Q-8 Phone 5651683, 5651684, 5651728	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES CONSULTING ENGINEERS & PROJECT MANAGERS 185-C BLOCK-2, P.O. H.SOCIETY OFF. SHARBA FADAL/SHARBAH-E-QUADKHA, KARACHI-75400, PAKISTAN	Date JAN, 2019
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates Electrical & Mechanical Consultant Sul No. 404/182 4th floor Heman Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL # 021-2259021 EMAIL: engineer_deneed@yahoo.com	Drawn F.P
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Checked N.K
		Drawing No PS-02



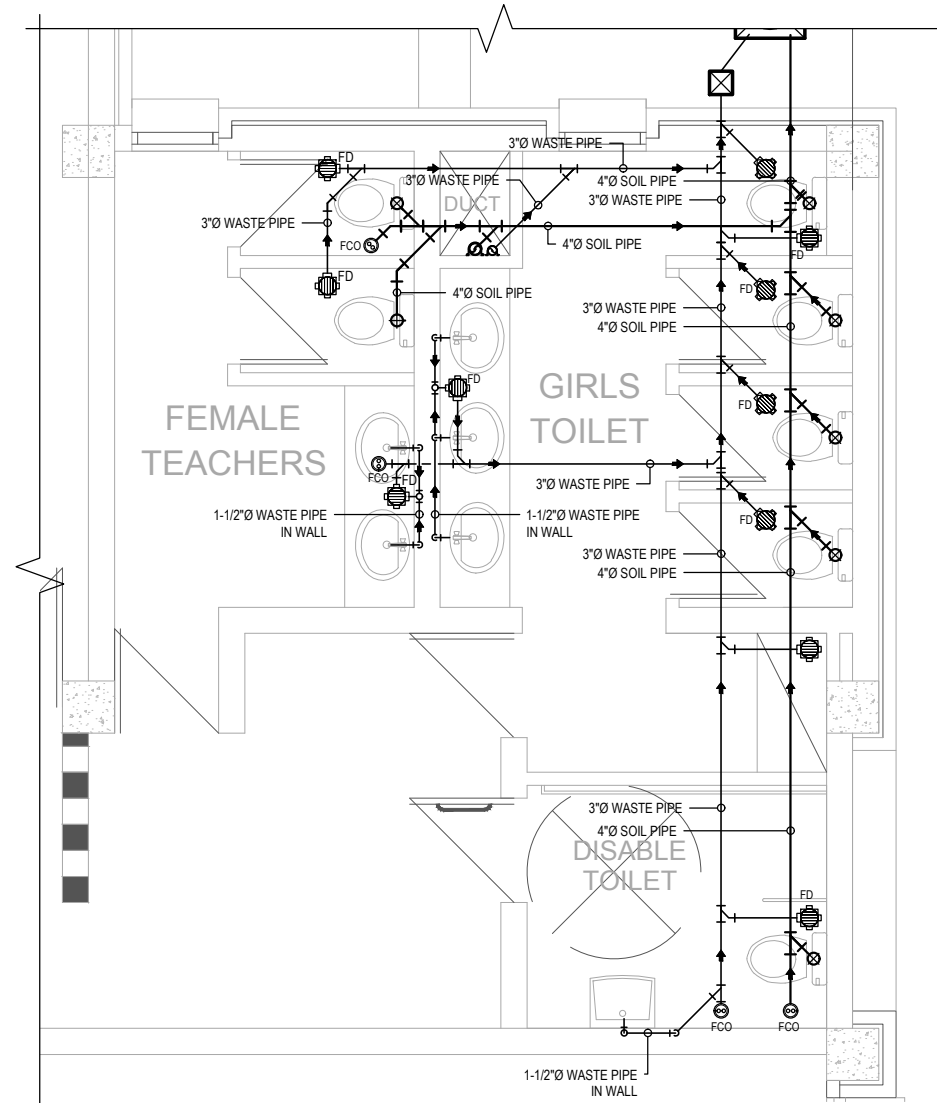
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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
FIRST FLOOR PLAN DRAINAGE SYSTEM		
ARCHITECT :	HABIB FIDA ALI Architects 4-C/1, Feroz Khan Road Karachi Q/LB1 Phone 5651683, 5651681, 5651720	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES CONSULTING ENGINEERS & PROJECT PLANNERS 185-C BLOCK-2, P.O. H.SOCIETY OFF. SHARBA FARAZ/SHARBAH-E-QUAIDEN, KARACHI-75400, PAKISTAN	Date JAN, 2019
ELECTRICAL CONSULTANT:	Design & Development Engineering Associates Electrical & Mechanical Consultant Sult No. 404/182 4th floor Hameed Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL # 021-2259021 EMAIL: enginere.dereed@yahoo.com	Drawn F.P
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS 100, Jinnah Road, Phase 1, D-11, Block 10, F-10, Islamabad	Checked N.K
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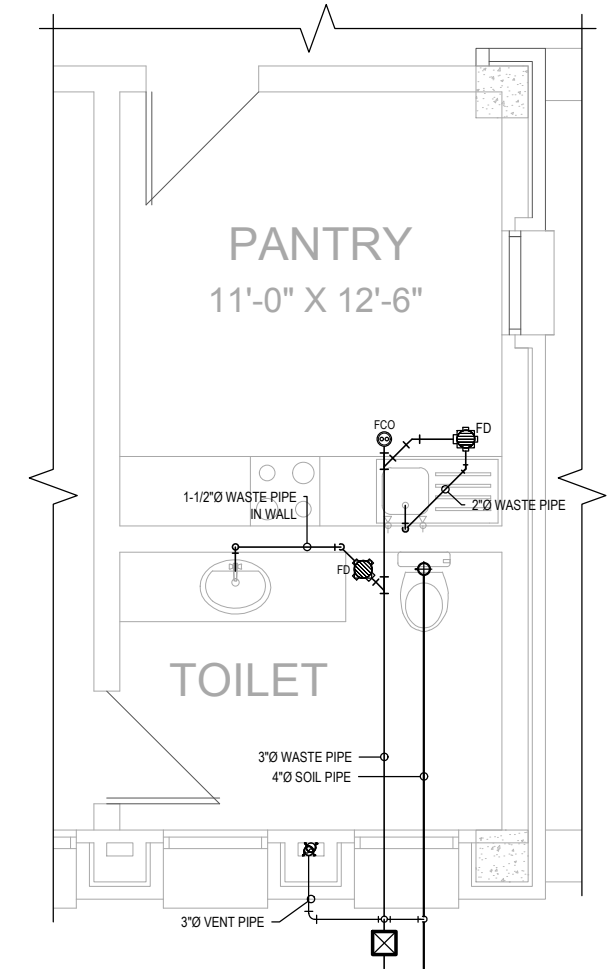
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DRAWING TITLE		COMMUNITY COLLEGE
ROOF PLAN DRAINAGE SYSTEM		
ARCHITECT :		Scale
HABIB FIDA ALI Architects <small>4-C/1, Feroz Khan Road Karachi Q/81 Phone 5651683, 5651681, 5651728</small>		1/16" = 1'-0"
STRUCTURE ENGINEER :		Date
 LOYA ASSOCIATES <small>CHIEF ARCHITECT & PROJECT MANAGER 185-C-BLOCK-2, P.O. SOCIETY OFF. SHARBA FADAL/SHARBAH-E-QUADKHEH, KARACHI-75400, PAKISTAN</small>		JAN, 2019
ELECTRICAL CONSULTANT:		Drawn
Design & Development Engineering Associates <small>Electrical & Mechanical Consultant S-11, 404/152-4th, floor Hiranagar Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL# 021-2259021 EMAIL: engin@designee.com</small>		F.P
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		Drawing No
		PS-04



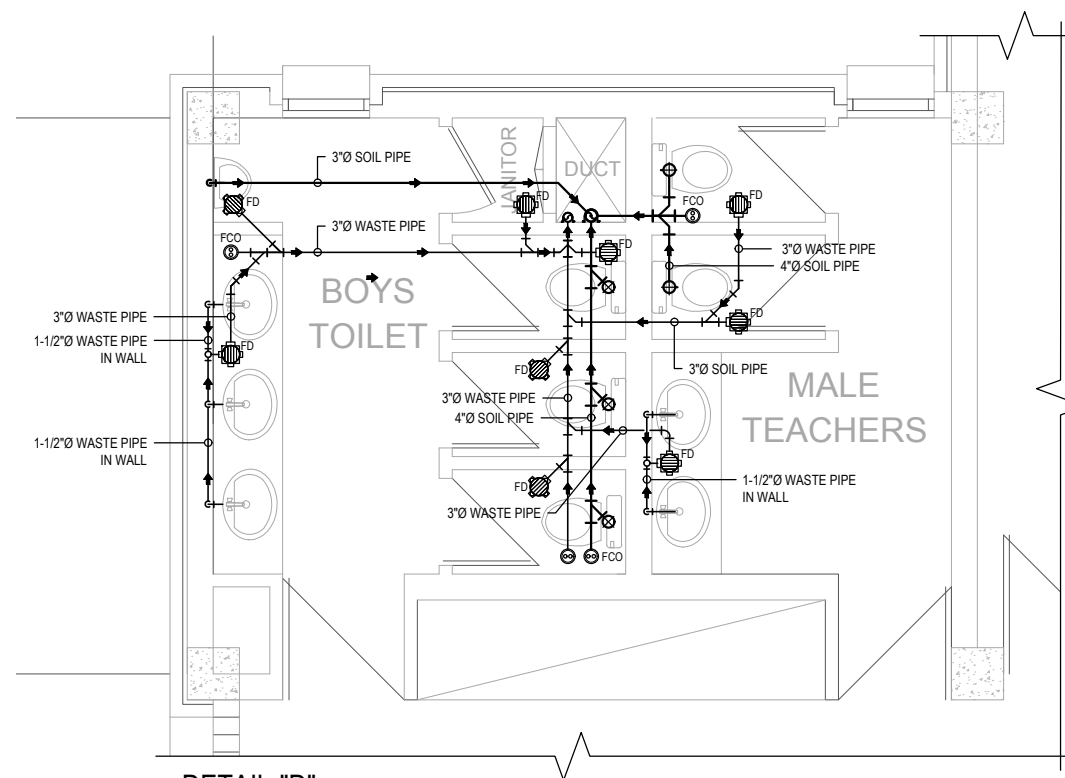
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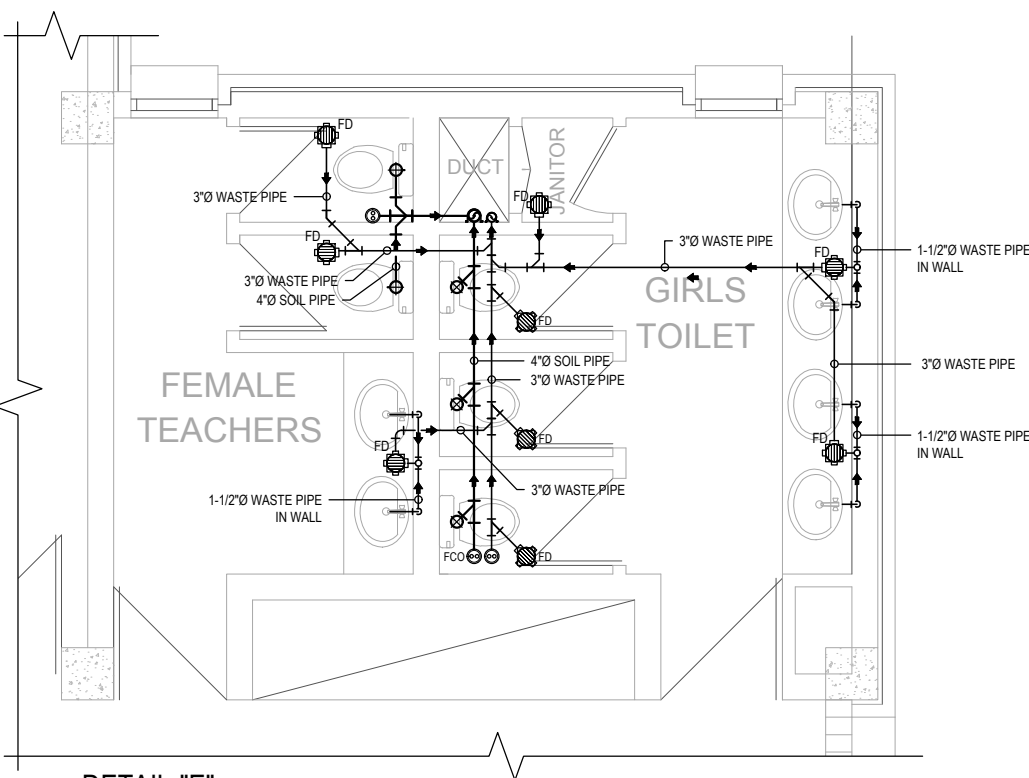
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DETAIL-"C"

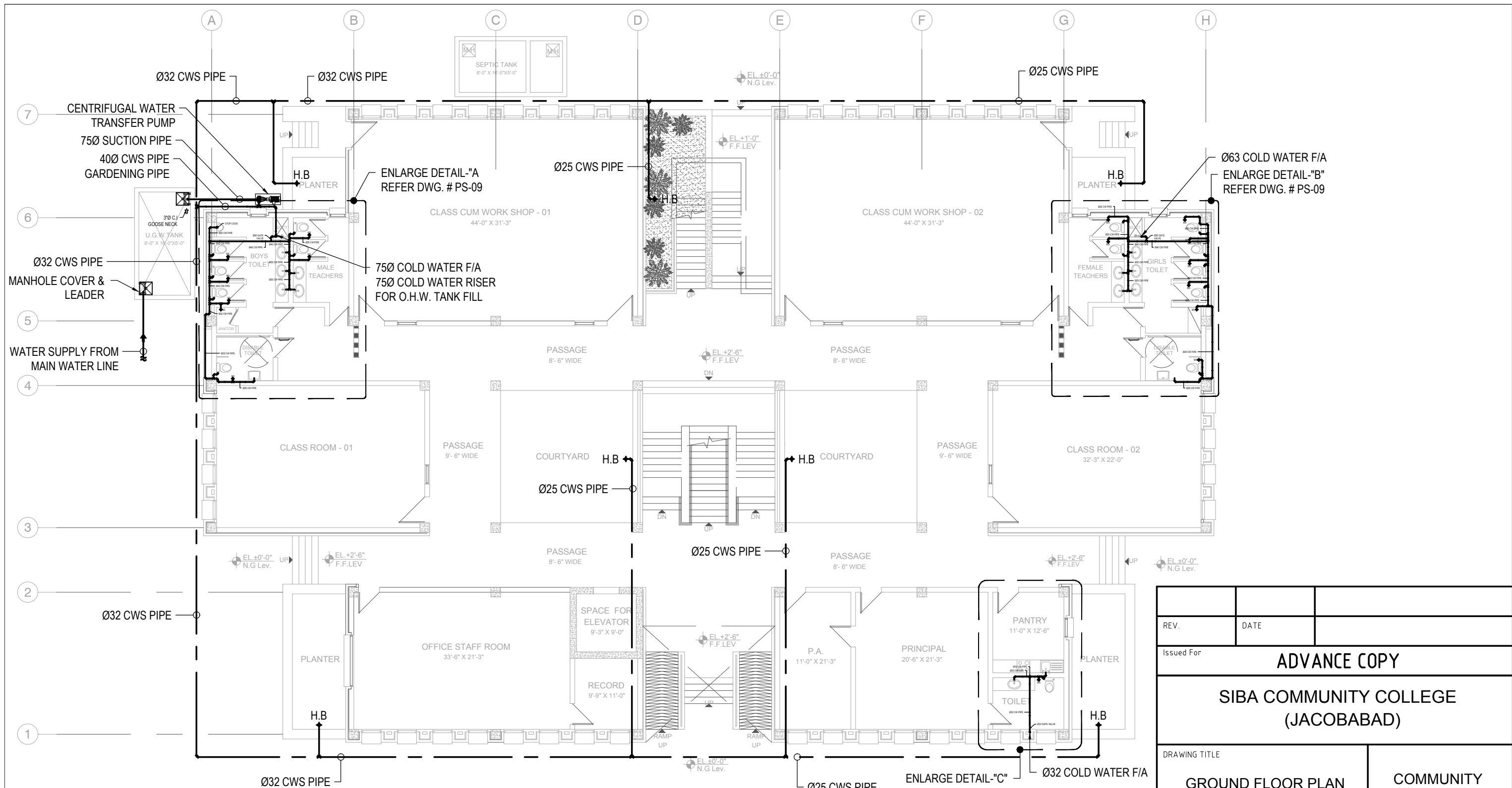


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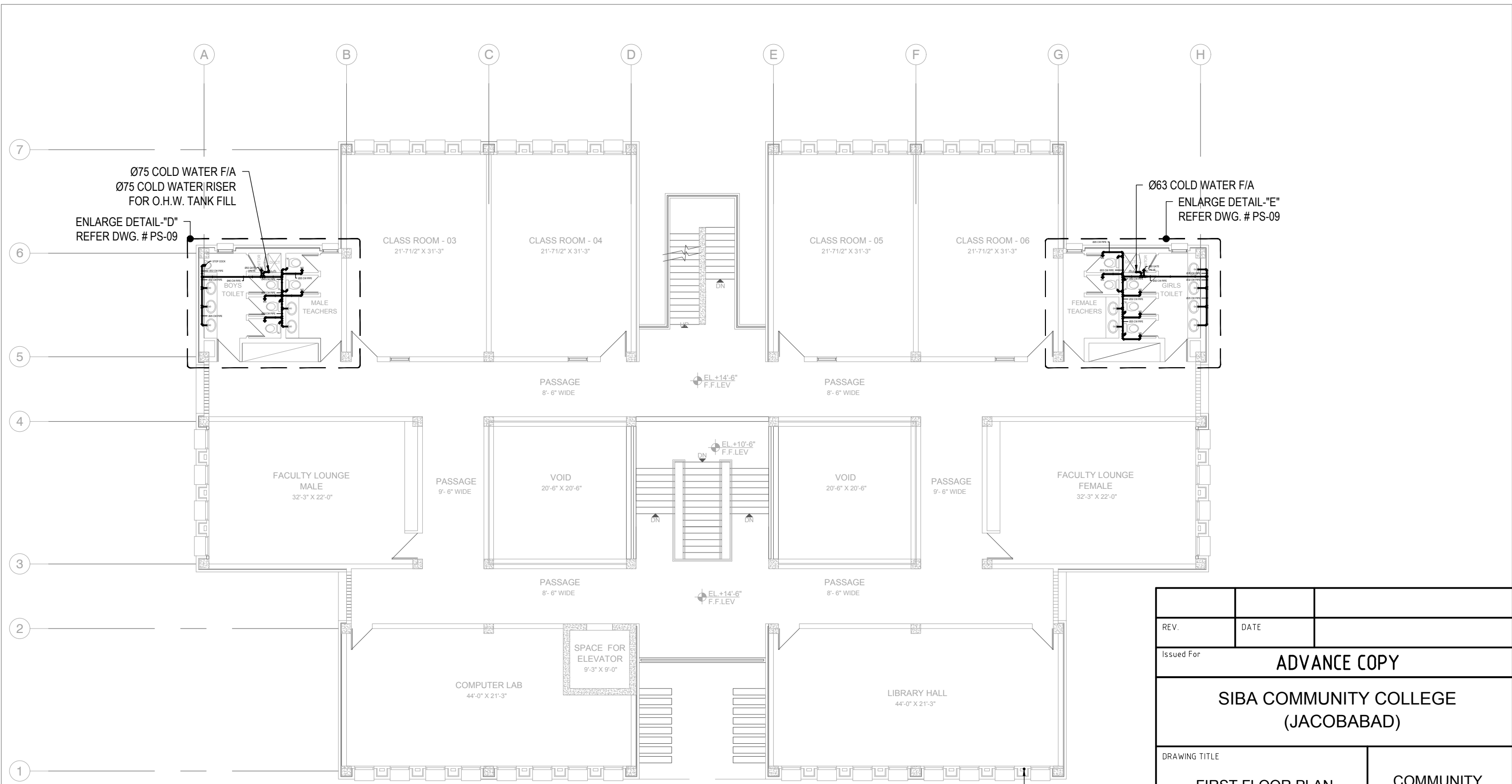


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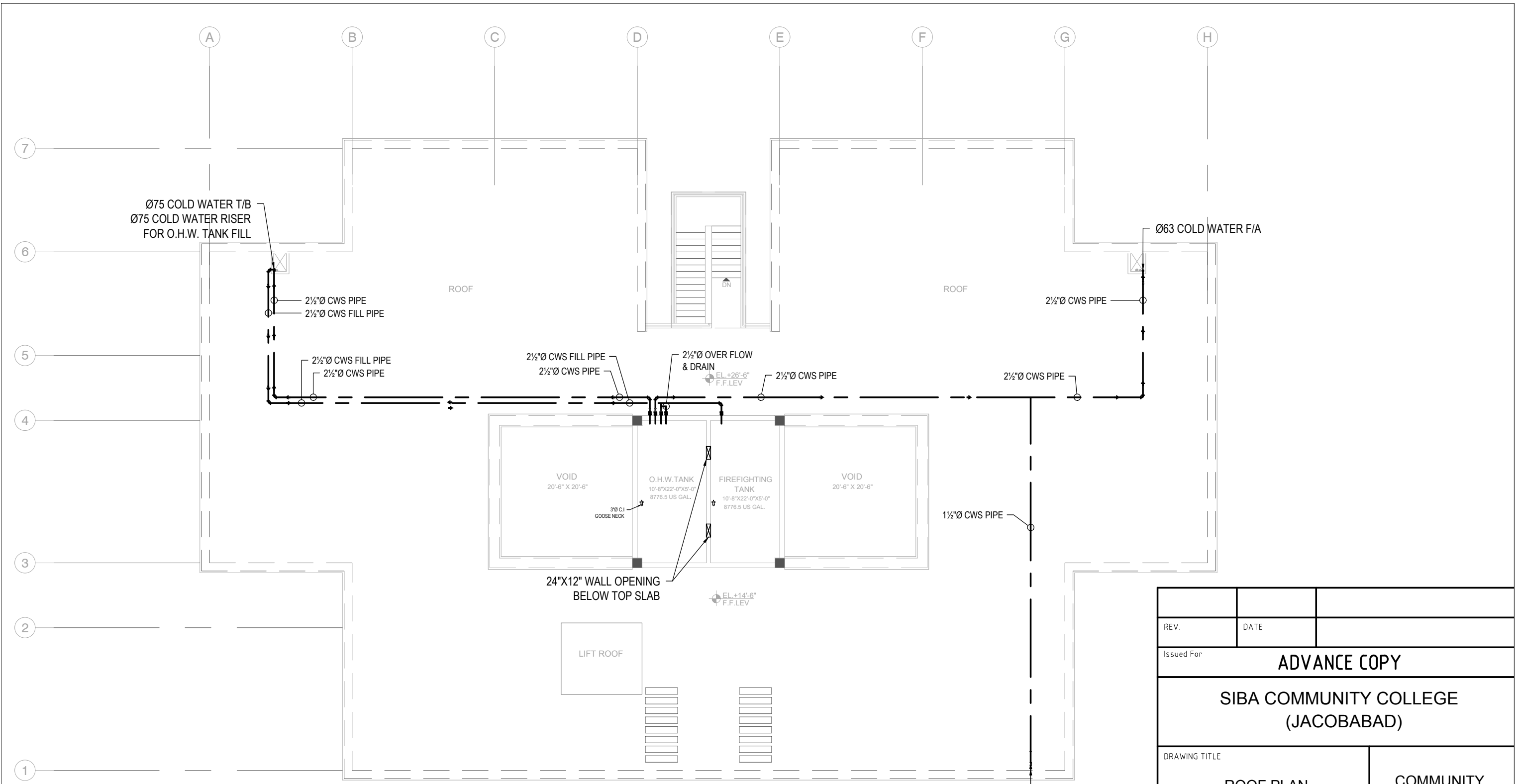
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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
ENLARGE DETAILS DRAINAGE SYSTEM		
ARCHITECT :		Scale
HABIB FIDA ALI Architects 4-C/1, Feroz Khan Road Karachi-75400, PAKISTAN		1/4" = 1'-0"
STRUCTURE ENGINEER :		Date
LOYA ASSOCIATES CIVIL ENGINEERS & ARCHITECTS 180-C BLOCK-2, P.O. SOCIETY OFF. SHARBA, FARAZ/SHARBAH-E-QUADKHE, KARACHI-75400, PAKISTAN		JAN, 2019
ELECTRICAL CONSULTANT:		Drawn
Design & Development Engineering Associates Electrical & Mechanical Consultant Sui No. 404/182-4th, floor Heman Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL: 031-2250021 EMAIL: engineer_deneed@yahoo.com		F.P
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N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS		N.K
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		PS-05



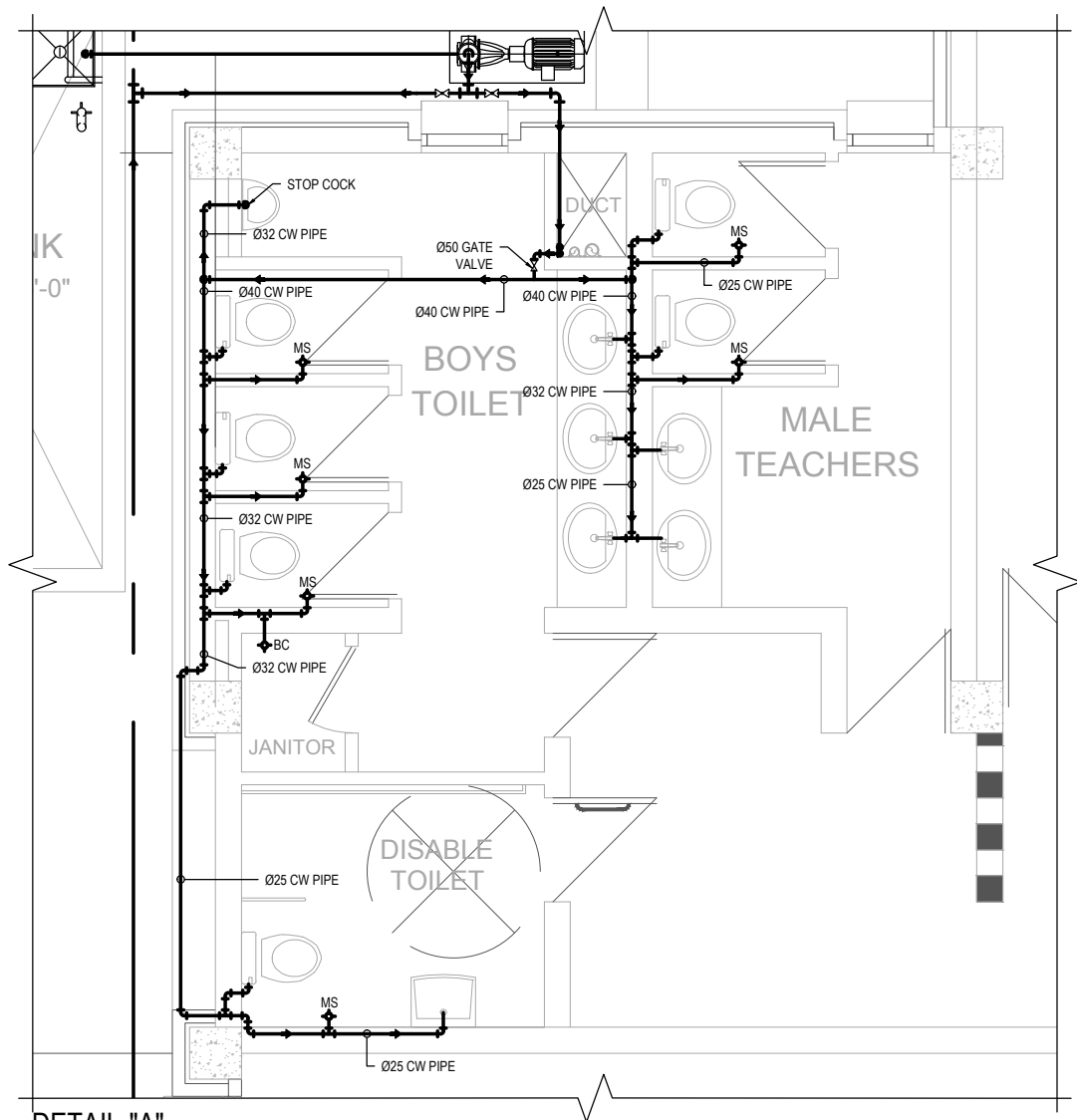
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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
GROUND FLOOR PLAN WATER SUPPLY SYSTEM		
ARCHITECT :	HABIB FIDA ALI Architects 4-D, Faisalabad Road Karachi Q/LB1 Phone 5651683, 5651681, 5651720	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES Electrical & Mechanical Consultant S-11, F-7/2, Phase-7, Islamabad	Date JAN, 2019
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates Electrical & Mechanical Consultant S-11, F-7/2, Phase-7, Islamabad Karachi: Tel: 021-36548014 CELL # 021-2250021 EMAIL: engineer_sajid@yaho.com	Drawn F.P
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS S-11, F-7/2, Phase-7, Islamabad Karachi: Tel: 021-36548014 CELL # 021-2250021 EMAIL: engineer_sajid@yaho.com	Checked N.K
		Drawing No PS-06



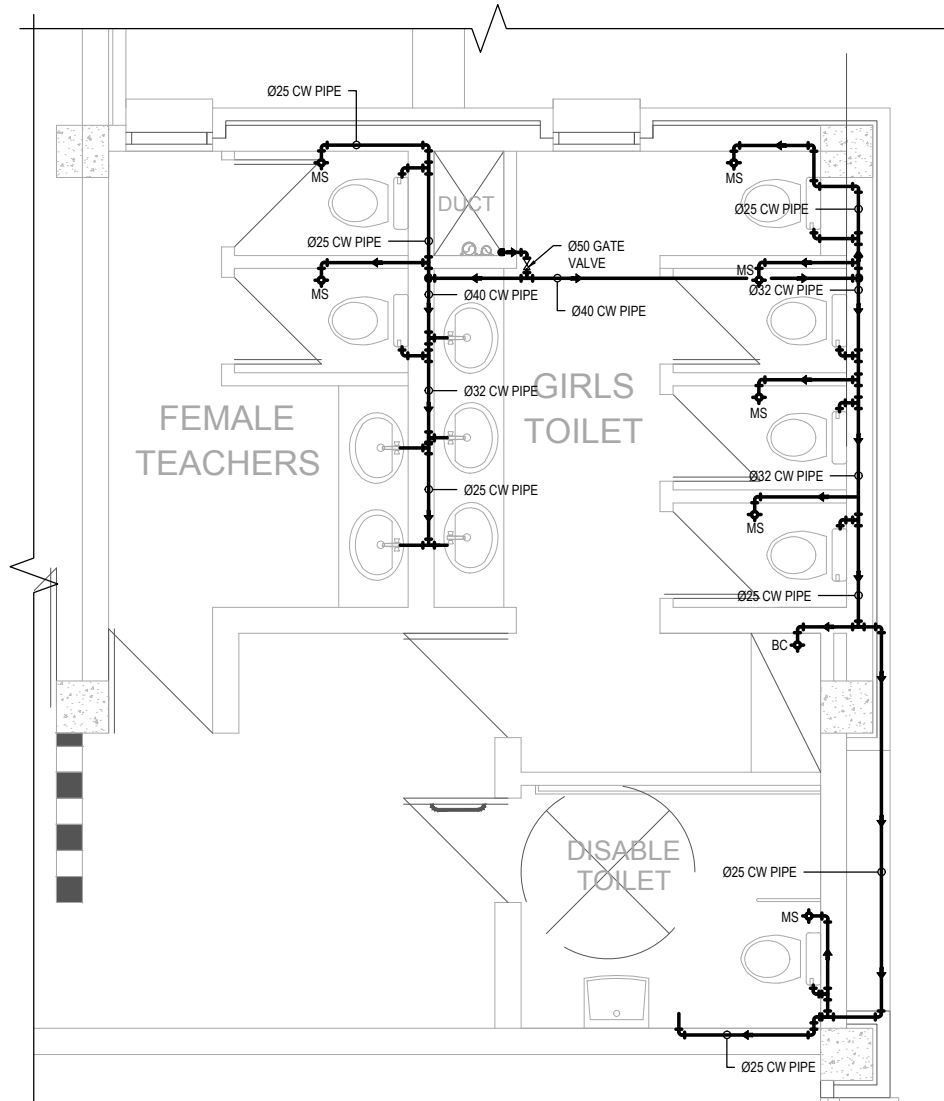
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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
FIRST FLOOR PLAN WATER SUPPLY SYSTEM		
ARCHITECT :	HABIB FIDA ALI Architects 4-D, Faisalabad Cantonment Road Karachi Qurbani Phone 5651683, 5651684, 5651720	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES ELECTRICAL & MECHANICAL CONSULTANT	Date JAN, 2019
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates Electrical & Mechanical Consultant Suit No. 404/402 4th floor Hameed Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL # 021-2250021 EMAIL: engineer_dereed@yahoo.com	Drawn F.P
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS	Checked N.K
		Drawing No PS-07



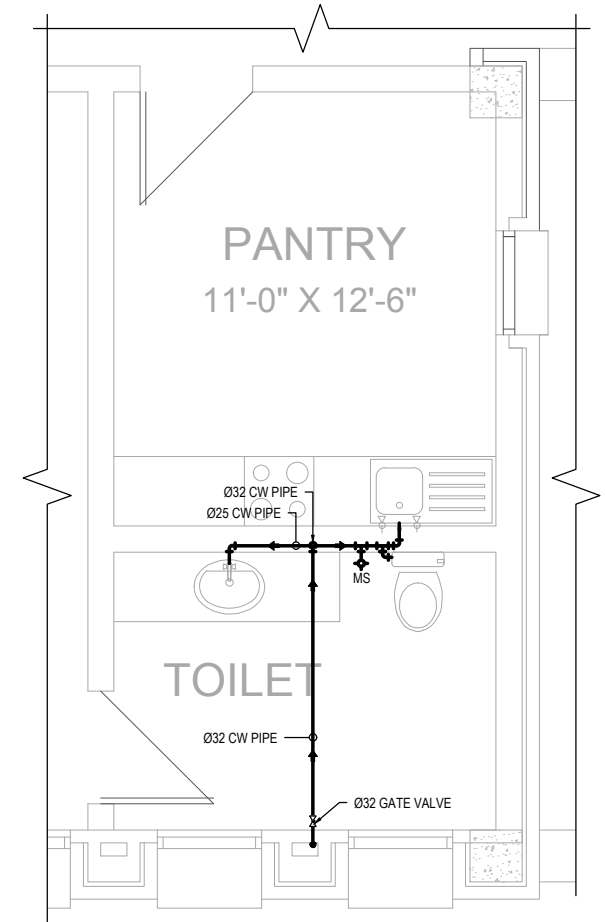
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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
ROOF PLAN WATER SUPPLY SYSTEM		
ARCHITECT :	HABIB FIDA ALI Architects 4-D-1/Minareet Zaman Road Karachi Q/L1 Phone 5651683, 5651681, 5651720	Scale 1/16" = 1'-0"
STRUCTURE ENGINEER :	LOYA ASSOCIATES ELECTRICAL & MECHANICAL CONSULTANTS S-11/Minareet Zaman Road Karachi Q/L1 Phone 5651683, 5651681, 5651720	Date JAN, 2019
ELECTRICAL CONSULTANT :	Design & Development Engineering Associates Electrical & Mechanical Consultant S-11/Minareet Zaman Road Karachi Q/L1 Phone 5651683, 5651681, 5651720 EMAIL: engineer_dereed@yahoo.com	Drawn F.P
PLUMBING CONSULTANT :	N.A. ASSOCIATES MECHANICAL CONSULTING ENGINEERS S-11/Minareet Zaman Road Karachi Q/L1 Phone 5651683, 5651681, 5651720 EMAIL: engineer_dereed@yahoo.com	Checked N.K
		Drawing No PS-08



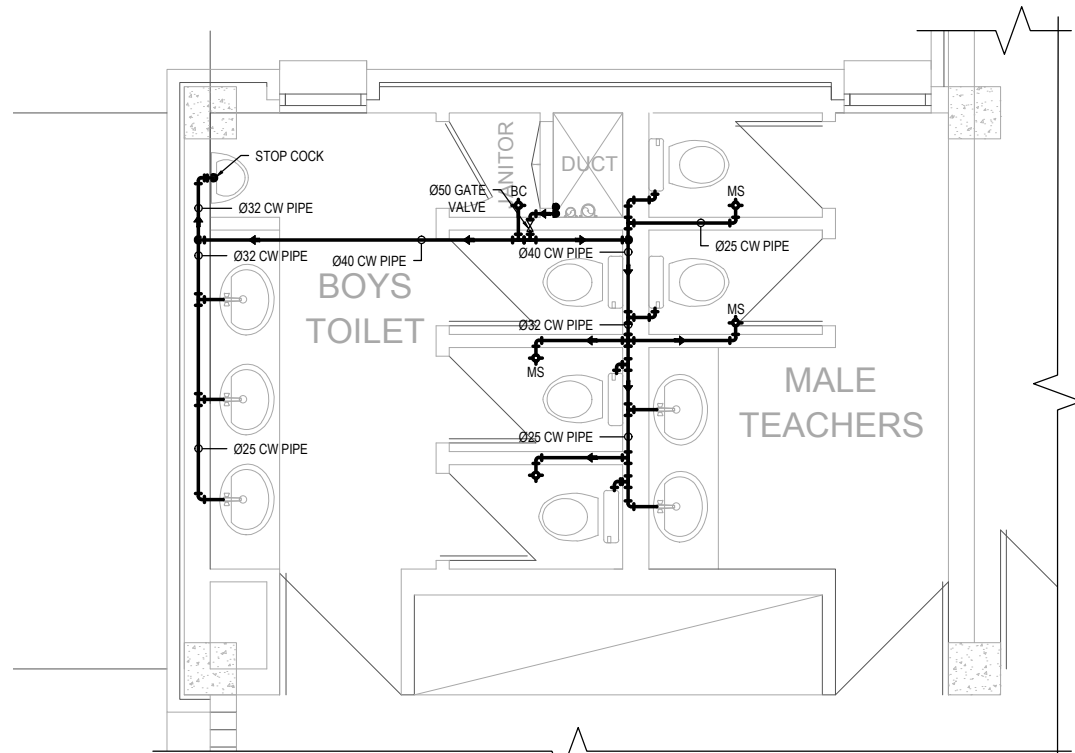
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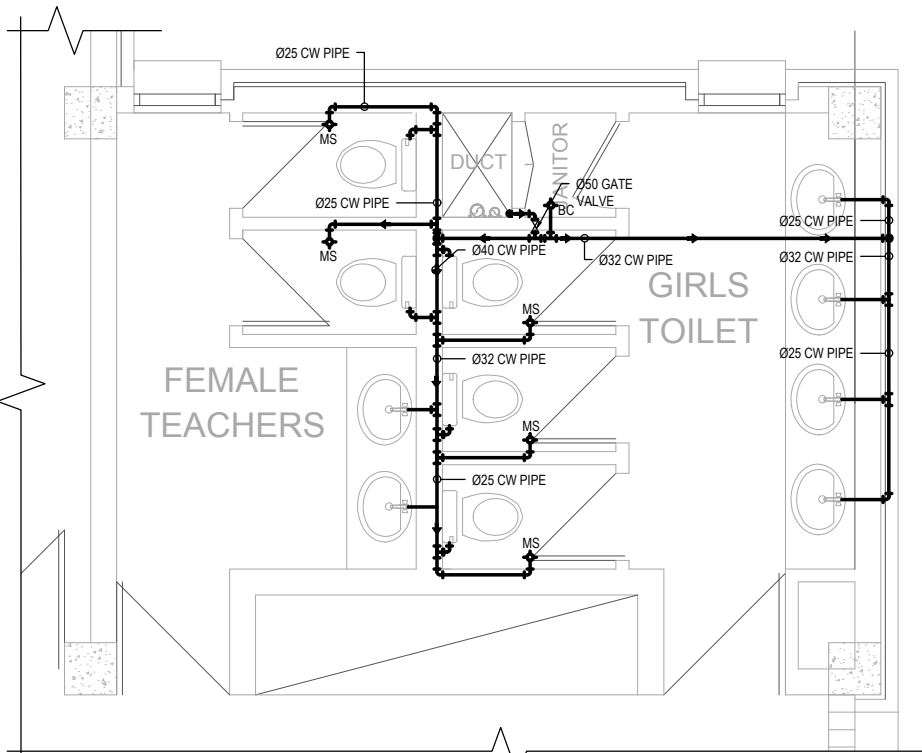
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DETAIL-"C"

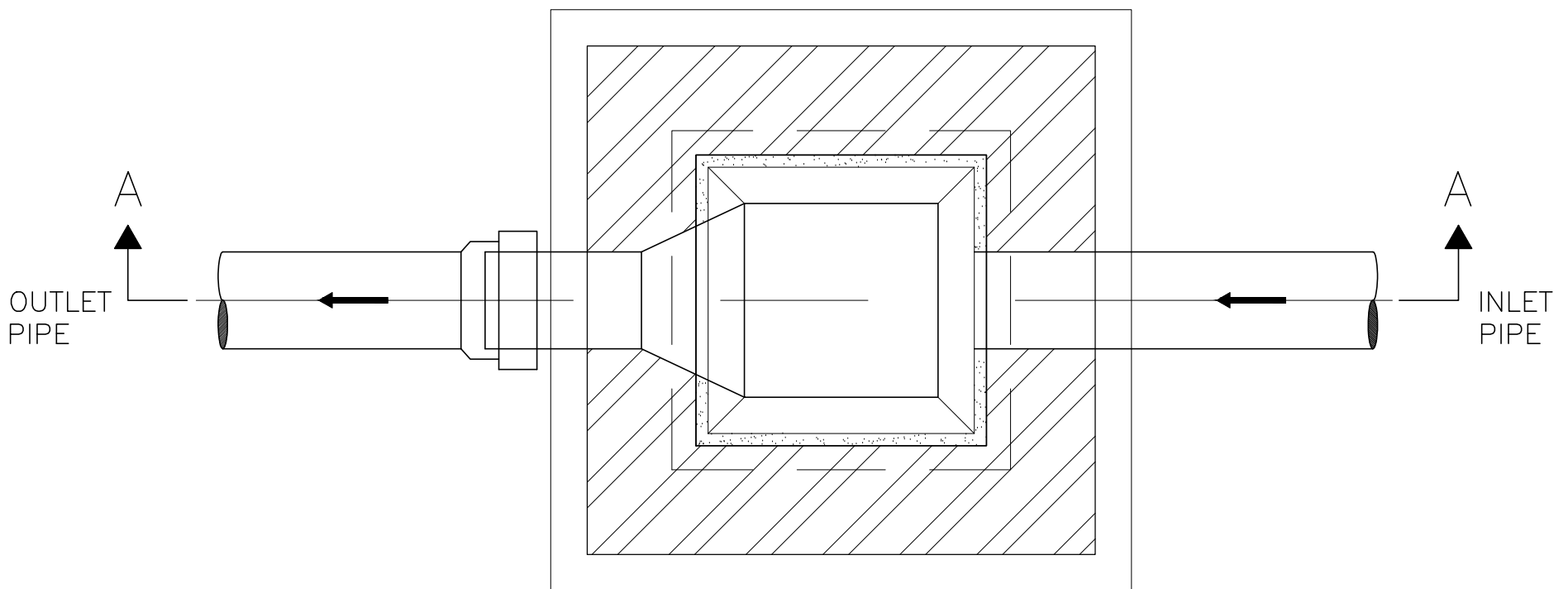


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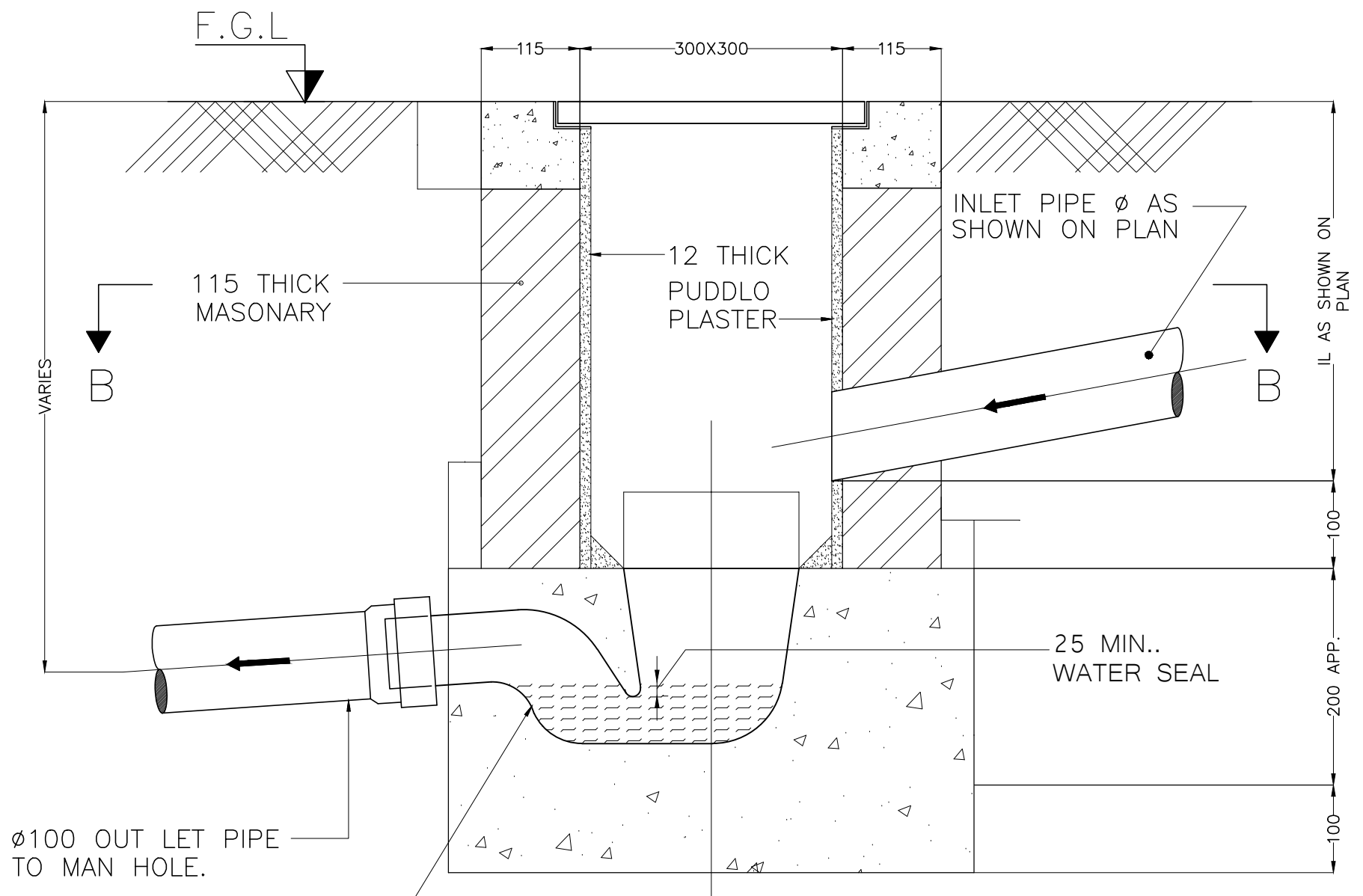


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SIBA COMMUNITY COLLEGE (JACOBABAD)		
DRAWING TITLE		COMMUNITY COLLEGE
ENLARGE DETAILS WATER SUPPLY SYSTEM		
ARCHITECT :		Scale
HABIB FIDA ALI Architects <small>4-27, Firdous Manzil, Main Road Karachi QULBI Phone 5651683, 5651684, 5651720</small>		1/4" = 1'-0"
STRUCTURE ENGINEER :		Date
 LOYA ASSOCIATES <small>Electrical & Mechanical Consultant</small>		JAN, 2019
ELECTRICAL CONSULTANT:		Drawn
Design & Development Engineering Associates <small>Electrical & Mechanical Consultant Sui No. 404/182/4th, floor Hassan Center 55 D.A.C.H.S Main Shahrah-e-Faisal Karachi. Tel: 021-36548014 CELL # 021-2259021 EMAIL: engin@designee.com</small>		F.P
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		Drawing No
		PS-09



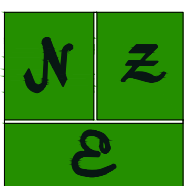
PLAN



SECTION A-A

NOTE:-

1. ALL DIMENSIONS IN mm



N.Z ENGINEERS

PLOT NO. 70C , M-01 JAMI
COMMERCIAL , STREET 9
PHASE-VII, D.H.A KARACHI.
Tel: +92 213 5314095
Email: info@nzengineers.net

TITLE

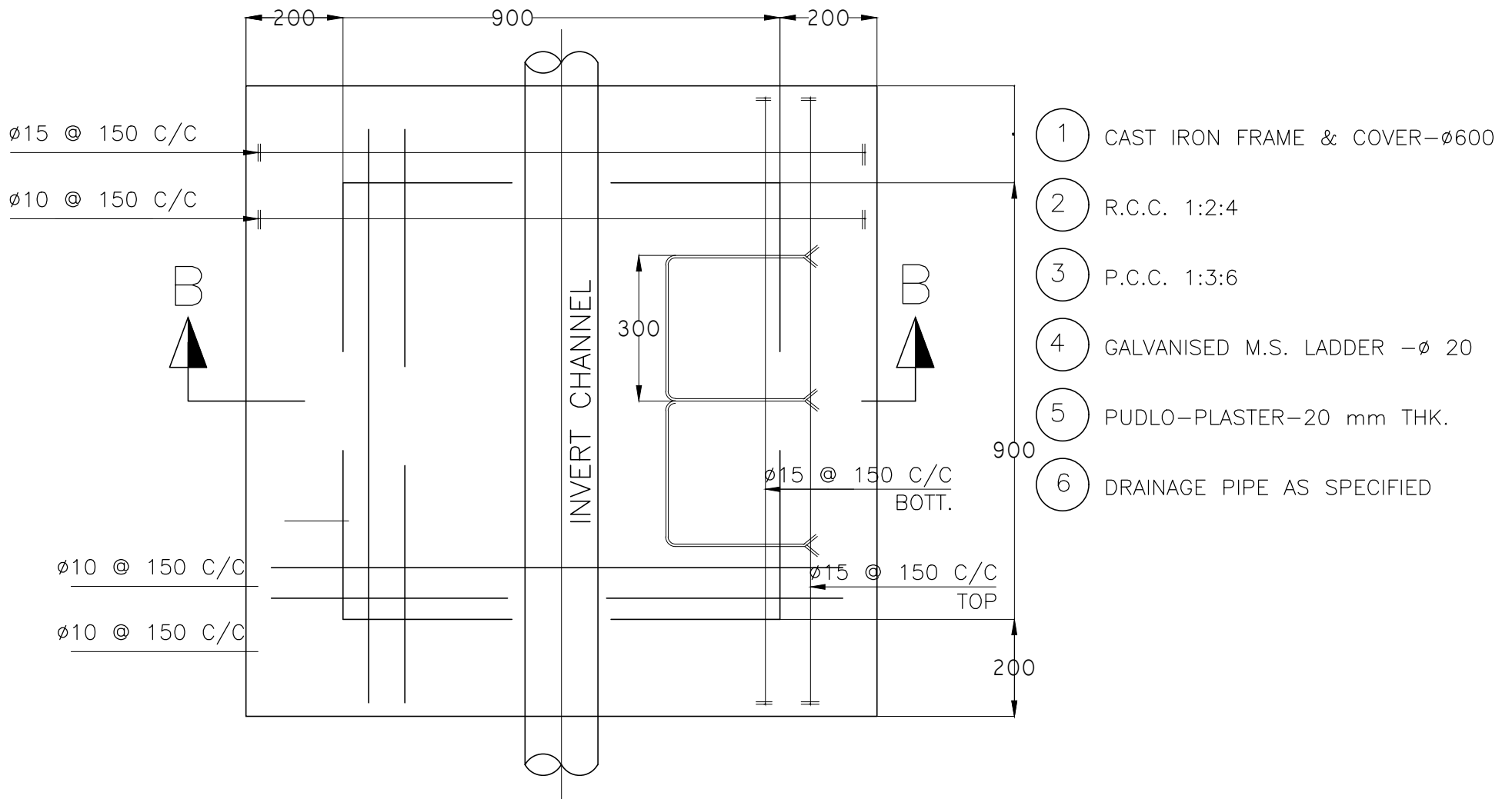
GULLY TRAP DETAIL

DETAIL NO.

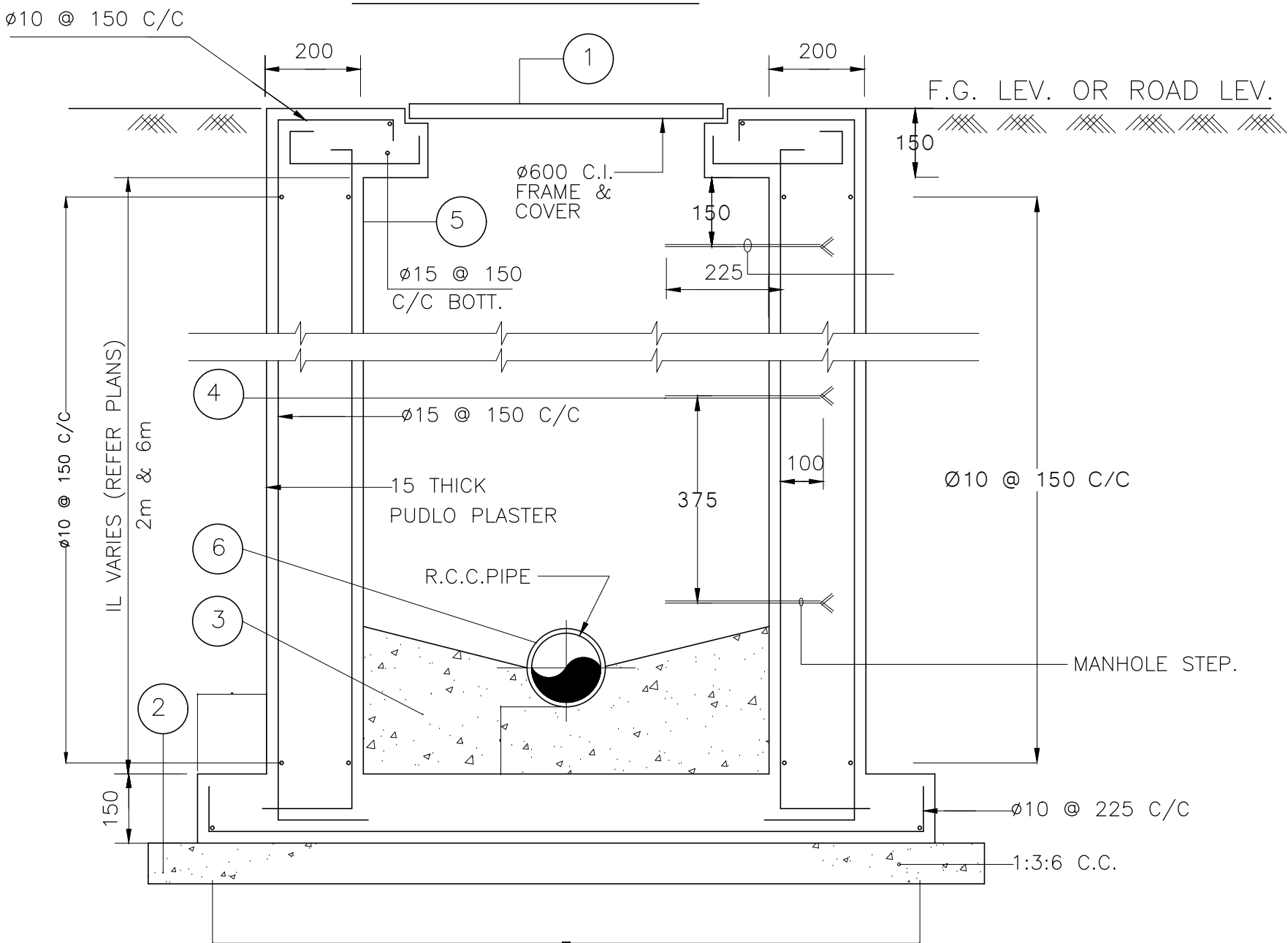
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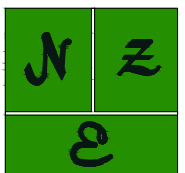
10/03/04



MANHOLE PLAN



SECTION B-B



N.Z ENGINEERS
 PLOT NO. 70C, M-01 JAMI
 COMMERCIAL, STREET 9
 PHASE-VII, D.H.A KARACHI.
 Tel: +92 213 5314095
 Email: info@nzengineers.net

TITLE
 MANHOLE TYPE "D" FOR
 TRAFFIC & NON-TRAFFIC AREA
 DEPTH FROM 2m & 6m

DETAIL NO.

NZ/P/12

REV.NO

10/02/04

STRUCTURAL DRAWINGS

FOR TENDER

SEPTEMBER 2021

GENERAL NOTES

A) GENERAL

- THESE NOTES SHOULD BE READ IN CONJUNCTION WITH RELEVANT TENDER/CONTRACT CONDITIONS, SPECIFICATIONS AND BILL OF QUANTITIES FOR THE PROJECT. WHEREVER MORE THAN ONE SET OF STANDARDS IS USED TO SPECIFY A MATERIAL, TEST OR LEVEL OF WORKMANSHIP THE MOST STRINGENT REQUIREMENTS SHALL GOVERN UNLESS SPECIFICALLY OTHERWISE NOTED.
- ALL MATERIALS USED AND WORKMANSHIP INVOLVED IN THE EXECUTION OF ALL WORKS COVERED UNDER THIS CONTRACT SHALL BE IN STRICT CONFORMITY WITH DRAWINGS, SPECIFICATIONS AND CONTRACT CONDITIONS.
- ALL DIMENSIONS INDICATED ON THE DRAWING ARE IN FOOT-POUND SYSTEM (FPS).
- WHERE REFERENCE STANDARDS FOR TESTING MATERIALS AND WORKMANSHIP ARE NOT EXPLICITLY STATED ON THE DRAWINGS AND TENDER/CONTRACT DOCUMENTS, LATEST RELEVANT STANDARDS OF ACI, ASTM, OR BS SHALL BE APPLICABLE AS INSTRUCTED BY THE ENGINEER.
- THE LEVELS SHOWN ON THESE DRAWINGS ARE STRUCTURAL LEVELS AND DO NOT INCLUDE FLOOR FINISH ETC. UNLESS OTHERWISE NOTED.
- FINAL RESPONSIBILITY FOR PRECISE & ACCURATE SETTING OUT OF THE PROPOSED WORKS INCLUDING STRUCTURES RESTS SOLELY WITH THE CONTRACTOR.
- MATERIAL & WORKMANSHIP: ALL MATERIALS AND WORKMANSHIP SHALL MEET RELEVANT ACI, ASTM AND BRITISH STANDARDS AS DETAILED IN THE SPECIFICATIONS AND SUBJECT TO THE ENGINEER APPROVAL.

B) CEMENT

CEMENT USED SHALL BE FRESH, PAKISTAN MANUFACTURED, ORDINARY PORTLAND CEMENT CONFORMING TO ASTM-C150 OR/ BS-12. FOR ALL STRUCTURE COMPONENTS EXCEPT FOUNDATIONS WHERE NECESSARY TO USE SULPHATE RESISTANT CEMENT. USE SULPHATE RESISTING CEMENT (SRC) FOR ALL CONCRETE BELOW GROUND.

C) CONCRETE

THE FOLLOWING TYPES OF CONCRETE SHALL BE USED:

- CONCRETE FOR COLUMNS SHALL BE DESIGN MIX WITH MINIMUM CYLINDER STRENGTH AT 28 DAYS OF MATURITY AS 4000 PSI USING SULPHATE RESISTANT CEMENT EXCEPT NOTED ELSEWHERE WATER-CEMENT RATIO (WC) NOT TO EXCEED 0.45.
 - CONCRETE FOR ALL PILES SHALL BE DESIGN MIX WITH MINIMUM CYLINDER STRENGTH AT 28 DAYS OF MATURITY AS 4000 PSI USING ORDINARY PORTLAND CEMENT EXCEPT NOTED ELSEWHERE WATER-CEMENT RATIO (WC) NOT TO EXCEED 0.45.
 - CONCRETE FOR PILECAP, RETAINING WALLS, FLOOR SLABS, BEAMS & STAIRS U.G.W.T., O.H.W.T., MACHINE ROOM SLAB & ETC SHALL BE DESIGN MIX WITH MINIMUM CYLINDER STRENGTH AT 28 DAYS OF MATURITY AS 3000 PSI USING ORDINARY PORTLAND CEMENT EXCEPT NOTED ELSEWHERE WATER-CEMENT RATIO (WC) NOT TO EXCEED 0.50.
 - PLAIN CEMENT CONCRETE BLINDING SHALL BE NOMINAL MIX RATIO 1:4:8 WITH MINIMUM CYLINDER STRENGTH AT 28 DAY MATURITY AS 1000 PSI USING ORDINARY PORTLAND CEMENT. UNLESS OTHERWISE SPECIFIED SAND AND CRUSHED STONE FREE FROM DUST ANY ORGANIC MATERIAL SHALL BE USED.
 - TO INCREASE WORKABILITY OF THE CONCRETE CONSULTANTS APPROVED PLASTICIZER/ADMIXTURE MAY BE USED BY THE CONTRACTOR AT HIS OWN COST AFTER DETERMINING QUANTITY AT DESIGN MIX STAGE.
 - DESIGN MIX PREPARED UNDER LABORATORY CONDITIONS WILL SHOW CYLINDER STRENGTH 25% ABOVE THE REQUIRED WORKS STRENGTH OF THE FIELD CONCRETE.
 - MAXIMUM COARSE AGGREGATE SIZE SHALL BE AS FOLLOWS UNLESS, OTHERWISE APPROVED BY THE ENGINEER
 - * 3/4" FOR FOUNDATIONS, COLUMNS, BEAMS & WALLS
 - * 1/2" FOR SLABS
 - * 3/8" FOR WAFFLE SLABS
- MINIMUM CONCRETE COVER SHALL BE AS FOLLOWS UNLESS OTHERWISE SPECIFIED.

D) CONCRETE COVER

STRUCTURAL ELEMENT	BAR CATEGORY	MIN. CONCRETE COVER
PILES, PILECAPS (Concrete cast against and permanently exposed to earth.)	BOTTOM BARS	3"
	TOP & SIDE BARS	2"
BEAMS	LONGITUDINAL REINFORCEMENT	1 1/2"
	STIRRUPS	1"
COLUMNS	PRIMARY REINFORCEMENT TIES & SPIRALS	1 1/2"
OHWT (WALLS & SLABS)	SURFACE EXPOSED TO WATER / VAPOURS	1"
WAIST SLABS	TOP, BOTTOM & SIDES	1"
SLABS	TOP, BOTTOM & SIDES	3/4"

E) REINFORCING STEEL

- ALL REINFORCING STEEL BARS SHALL BE ROLLED FROM PRIME GRADE PAKISTAN STEEL BILLETS. REINFORCEMENT ROLLED FROM SCRAP STEEL, SHIP PLATE OR RE-ROLLED BILLETS SHALL NOT BE USED.
- BARS MARKED ON DRAWINGS AS "H" SHALL BE HIGH YIELD DEFORMED BARS WITH MINIMUM YIELD STRENGTH OF 410 N/mm² (APPROXIMATE 60,000 PSI) CONFORMING TO THE FOLLOWING STANDARDS: ASTM A615 GRADE 60 COLD DRAWN/ HOT ROLLED
- BARS MARKED ON DRAWINGS AS "M" OR OTHERWISE UNMARKED SHALL BE PLAIN ROUND BARS WITH MINIMUM YIELD STRENGTH OF 250 N/mm² (APPROXIMATE 36,000 PSI) CONFORMING TO THE FOLLOWING STANDARDS: ASTM A615 GRADE 40 HOT ROLLED
- UNLESS OTHERWISE SHOWN ON THE DRAWINGS, LAPS IN REINFORCING BARS SHALL BE STAGGERED MINIMUM LENGTH OF LAP SHALL BE AS FOLLOWS:

GRADE 60 BAR DIA. IN 1/8 MULTIPLE OF INCH	LAP SPLICE LENGTH FOR PILECAP WITH fc' 3000 PSI.		LAP SPLICE LENGTH FOR COLUMNS & SHEAR WALLS
	BARS AT ALL LOCATION EXCEPT TOP BARS	TOP	WITH fc' 4000 PSI.
NO.3	1'-10"	2'-4"	1'-7"
NO.4	2'-6"	3'-1"	2'-1"
NO.5	3'-0"	4'-0"	2'-7"
NO.6	3-7"	4'-8"	3'-1"
NO.8	6'-0"	7'-9"	5'-2"

* TOP BAR MEANS HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCH OF FRESH CONCRETE IS CAST BELOW THE BAR BEING DEVELOPED OR SPLICED.

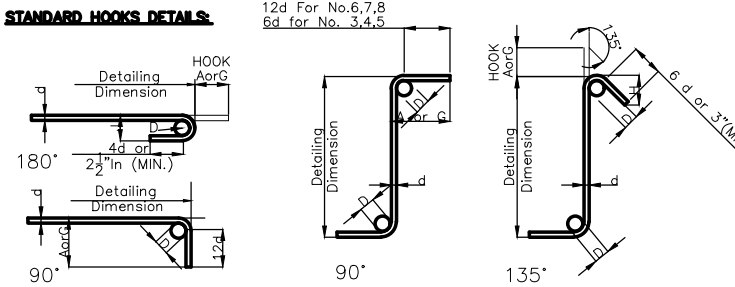
5) REINFORCEMENT IN MEMBERS RESISTING EARTHQUAKE-INDUCED FORCES

REINFORCEMENT RESISTING EARTHQUAKE-INDUCED FLEXURAL AND AXIAL FORCES IN FRAME MEMBERS AND IN STRUCTURAL WALL BOUNDARY ELEMENTS SHALL COMPLY WITH ASTM A706. ASTM A 615 GRADE 40 AND 60 REINFORCEMENT SHALL BE PERMITTED IN THESE MEMBERS IF:

- THE ACTUAL YIELD STRENGTH BASED ON MILL TESTS DOES NOT EXCEED FY BY MORE THAN 18,000 PSI (RETESTS SHALL NOT EXCEED THIS VALUE BY MORE THAN AN ADDITIONAL 3000 PSI); AND
- THE RATIO OF THE ACTUAL TENSILE STRENGTH TO THE ACTUAL YIELD STRENGTH IS NOT LESS THAN 1.25.

THE VALUE OF FYT FOR TRANSVERSE REINFORCEMENT INCLUDING SPIRAL REINFORCEMENT SHALL NOT EXCEED 60,000 PSI.

6) STANDARD HOOKS DETAILS



STANDARDS HOOKS-90°

BAR DIA "d" (INCHES)	D (INCHES)	A or G (INCHES)
3/8	2.25	6.00
1/2	3.00	8.00
5/8	3.75	10.00
3/4	4.50	12.00
1	6.00	16.00

STIRRUPS & TIE HOOKS-180°

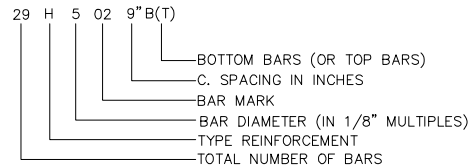
BAR DIA "d" (INCHES)	D (INCHES)	A or G (INCHES)	J (INCHES)
3/8	2.25	5.00	3.00
1/2	3.00	6.00	4.00
5/8	3.75	7.00	5.00
3/4	4.50	8.00	6.00
1	6.00	11.00	8.00

STANDARDS HOOKS-135°

BAR DIA "d" (INCHES)	D (INCHES)	A or G (INCHES)	H (INCHES)
3/8	1.5	4.25	3.00
1/2	2.00	4.50	3.00
5/8	2.50	5.50	3.75
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THE FOLLOWING IS AN EXAMPLE OF TYPICAL NOTATION USED TO CALL OUT REINFORCING STEEL ON THESE DRAWINGS:



F. NOTES FOR PILING WORKS:-

i) PILING WORK:

PILING WORK SHALL BE EXECUTED BY THE CONTRACTOR USING THE PERCUSSION, ROTARY OR OTHER APPROVED METHOD. A TEMPORARY STEEL CASING SHALL BE DRIVEN AHEAD OF THE BOREHOLE TO REQUIRED DEPTH TO ENSURE BOREHOLE STABILITY CONTRACTOR SHALL BE RESPONSIBLE FOR THE REQUIRED SHAPE AND LENGTH OF BOREHOLE AND FINISHED PILE.

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PILE CONCRETING WILL BE CONTINUED WITH IMMERSED TREMIE UNTIL THE INITIAL BATCH OF CONTAMINATED CONCRETE HAS OVER FLOWN AND THE PILE CONCRETE SURFACE IS AT LEAST 2'-0" ABOVE THE FINAL CUT OFF LEVEL. THIS EXTRA LENGTH OF CONCRETE SHALL SUBSEQUENTLY BE CUT OFF AFTER MINIMUM 3 DAYS TO ACHIEVE A UNIFORM SOUND CONCRETE BED FOR LOAD TESTING. PILE ONCE REJECTED BY ENGINEER SHALL NOT BE ALLOWED FOR ANY TESTING BY CONTRACTOR TO PROVE ITS SUITABILITY FOR PERMANENT WORK. ADDITIONAL REQUIRED PILES DUE TO SUCH REJECTION BE DONE BY CONTRACTOR AT HIS OWN COST. IF TREMIE IS WITHDRAWN PREMATURELY BEFORE FINAL BATCH OF CONCRETE OR IS STUCK IN WET CONCRETE, THE PILE WILL BE REJECTED.

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STRUCTURAL CONCRETE AND REINFORCING STEEL FOR TEST PILE SHALL CONFORM TO THE GENERAL NOTES.

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EMBEDDED ITEMS AND HOLD FAST REQUIRED FOR DOORS AND WINDOWS ARE NOT SHOWN IN STRUCTURAL DRAWINGS FOR ALL SUCH ITEMS ARCHITECTURAL DRAWINGS MUST BE REFERRED BEFORE PLACING CONCRETE. CARE SHALL BE TAKEN THAT ALL EMBEDDED ITEMS ARE IN POSITION AND SECURELY FASTENED IN PLACE. EMBEDDED ITEMS SHALL BE FREE OF OIL & OTHER FOREIGN MATTER SUCH AS LOOSE COATING OF RUST. FOR SLEEVES AND EMBEDDED ITEMS REFER ELECTRICAL, HVAC, PLUMBING DRAWINGS.

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CONTRACTOR'S DRAWINGS SHALL BE CO-ORDINATED WITH ENGINEERING DRAWINGS. THESE SHALL BE GOT APPROVED BY THE STRUCTURAL ENGINEER'S OFFICE 15-DAYS BEFORE START OF THE RELEVANT CONSTRUCTION ACTIVITY.

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FOR TENDER

PROJECT : IBA COMMUNITY COLLEGE JACOBABAD	ARCHITECT: HABIB FIDA ALI 4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530 TEL: 5661683,5661684, FAX:92-21-5686891	CONSULTANT: Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 100-C, Block-2, P.E.C.H.S.Off Sharae Faisal/Bahrah-e-Quaidoon P.O. Box No.18638, Karachi-75400, Pakistan. Phone: (99-21)4036100-48, Fax : (99-21)4034098, Email: info@loyaassociates.com, URL : www.loyaassociates.com	DRG. TITLE: GENERAL NOTES	<table border="1"> <tr> <th>DRAWN</th> <th>FARHAN SHAMSI</th> <th>SCALE</th> <th>AS SHOWN</th> </tr> <tr> <td>CHECKED</td> <td>A.F.</td> <td>JOB NO.</td> <td>19/18</td> </tr> <tr> <td>APPROVED</td> <td>K.A.</td> <td>DRG NO.</td> <td>IBA/CC/JGN-01</td> </tr> <tr> <td>DATE</td> <td>JAN '19</td> <td>REV.</td> <td>0</td> </tr> </table>	DRAWN	FARHAN SHAMSI	SCALE	AS SHOWN	CHECKED	A.F.	JOB NO.	19/18	APPROVED	K.A.	DRG NO.	IBA/CC/JGN-01	DATE	JAN '19	REV.	0
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LOYA ASSOCIATES

IBA COMMUNITY COLLEGE
JACOBABAD

ISSUE FOR TENDER

(JOB NO. 19/18)

S.NO.	DRG.NO.	DRAWING TITLE	REVISION
01	IBA/CCJ/GN-01	GENERAL NOTES	0
02	IBA/CCJ/S-01	COLUMN LAYOUT PLAN PLAN	0
03	IBA/CCJ/S-02	PILE LAYOUT PLAN	0
04	IBA/CCJ/S-03	REINFORCEMENT DETAILS OF PILE CAP (SHEET-1)	0
05	IBA/CCJ/S-04	REINFORCEMENT DETAILS OF PILE CAP (SHEET-2)	0
06	IBA/CCJ/S-05	DETAILS OF COLUMN	0
07	IBA/CCJ/S-06	PLINTH BEAM PLAN @ LEV. +2'-3"	0
08	IBA/CCJ/S-07	PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3" (SHEET-1)	0
09	IBA/CCJ/S-08	PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3" (SHEET-2)	0
10	IBA/CCJ/S-09	PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3" (SHEET-3)	0
11	IBA/CCJ/S-10	FIRST FLOOR FRAMING PLAN @ LEV. +14'-3"	0
12	IBA/CCJ/S-11	FIRST FLOOR REINFORCEMENT PLAN @ LEV. +14'-3"	0
13	IBA/CCJ/S-12	FIRST FLOOR BEAM ELEVATION & SECTION @ LEV. +14'-3" (SHEET-1)	0
14	IBA/CCJ/S-13	FIRST FLOOR BEAM ELEVATION & SECTION @ LEV. +14'-3" (SHEET-2)	0
15	IBA/CCJ/S-14	ROOF FRAMING PLAN @ LEV. +26'-3"	0
16	IBA/CCJ/S-15	ROOF REINFORCEMENT PLAN @ LEV. +26'-3"	0
17	IBA/CCJ/S-16	ROOF BEAM ELEVATION & SECTIONS @ LEV. +26'-3" (SHEET-1)	0
18	IBA/CCJ/S-17	ROOF BEAM ELEVATION & SECTIONS @ LEV. +26'-3" (SHEET-2)	0
19	IBA/CCJ/S-18	DETAIL OF O/H.W.TANK	0

GENERAL NOTES

A) GENERAL

- 1) THESE NOTES SHOULD BE READ IN CONJUNCTION WITH RELEVANT TENDER/CONTRACT CONDITIONS, SPECIFICATIONS AND BILL OF QUANTITIES FOR THE PROJECT. WHEREVER MORE THAN ONE SET OF STANDARDS IS USED TO SPECIFY A MATERIAL, TEST OR LEVEL OF WORKMANSHIP THE MOST STRINGENT REQUIREMENTS SHALL GOVERN UNLESS SPECIFICALLY OTHERWISE NOTED.
- 2) ALL MATERIALS USED AND WORKMANSHIP INVOLVED IN THE EXECUTION OF ALL WORKS COVERED UNDER THIS CONTRACT SHALL BE IN STRICT CONFORMITY WITH DRAWINGS, SPECIFICATIONS AND CONTRACT CONDITIONS.
- 3) ALL DIMENSIONS INDICATED ON THE DRAWING ARE IN FOOT-POUND SYSTEM (FPS).
- 4) WHERE REFERENCE STANDARDS FOR TESTING MATERIALS AND WORKMANSHIP ARE NOT EXPLICITLY STATED ON THE DRAWINGS AND TENDER/CONTRACT DOCUMENTS, LATEST RELEVANT STANDARDS OF ACI, ASTM, OR BS SHALL BE APPLICABLE AS INSTRUCTED BY THE ENGINEER
- 5) THE LEVELS SHOWN ON THESE DRAWINGS ARE STRUCTURAL LEVELS AND DO NOT INCLUDE FLOOR FINISH ETC. UNLESS OTHERWISE NOTED.
- 6) FINAL RESPONSIBILITY FOR PRECISE & ACCURATE SETTING OUT OF THE PROPOSED WORKS INCLUDING STRUCTURES RESTS SOLELY WITH THE CONTRACTOR.
- 7) MATERIAL & WORKMANSHIP: ALL MATERIALS AND WORKMANSHIP SHALL MEET RELEVANT ACI, ASTM AND BRITISH STANDARDS AS DETAILED IN THE SPECIFICATIONS AND SUBJECT TO THE ENGINEER APPROVAL.

B) CEMENT

CEMENT USED SHALL BE FRESH, PAKISTAN MANUFACTURED, ORDINARY PORTLAND CEMENT CONFORMING TO ASTM-C150 OR/ BS-12. FOR ALL STRUCTURE COMPONENTS EXCEPT FOUNDATIONS WHERE NECESSARY TO USE SULPHATE RESISTANT CEMENT. USE SULPHATE RESISTING CEMENT (SRC) FOR ALL CONCRETE BELOW GROUND.

C) CONCRETE

THE FOLLOWING TYPES OF CONCRETE SHALL BE USED:

- 1) CONCRETE FOR COLUMNS SHALL BE DESIGN MIX WITH MINIMUM CYLINDER STRENGTH AT 28 DAYS OF MATURITY AS 4000 PSI USING SULPHATE RESISTANT CEMENT EXCEPT NOTED ELSEWHERE WATER-CEMENT RATIO (WC) NOT TO EXCEED 0.45.
- 2) CONCRETE FOR ALL PILES SHALL BE DESIGN MIX WITH MINIMUM CYLINDER STRENGTH AT 28 DAYS OF MATURITY AS 4000 PSI USING ORDINARY PORTLAND CEMENT EXCEPT NOTED ELSEWHERE WATER-CEMENT RATIO (WC) NOT TO EXCEED 0.45.
- 3) CONCRETE FOR PILECAP, RETAINING WALLS, FLOOR SLABS, BEAMS & STAIRS U.G.W.T., O.H.W.T., MACHINE ROOM SLAB & ETC SHALL BE DESIGN MIX WITH MINIMUM CYLINDER STRENGTH AT 28 DAYS OF MATURITY AS 3000 PSI USING ORDINARY PORTLAND CEMENT EXCEPT NOTED ELSEWHERE WATER-CEMENT RATIO (WC) NOT TO EXCEED 0.50.
- 4) PLAIN CEMENT CONCRETE BLINDING SHALL BE NOMINAL MIX RATIO 1:4:8 WITH MINIMUM CYLINDER STRENGTH AT 28 DAY MATURITY AS 1000 PSI USING ORDINARY PORTLAND CEMENT. UNLESS OTHERWISE SPECIFIED SAND AND CRUSHED STONE FREE FROM DUST ANY ORGANIC MATERIAL SHALL BE USED.
- 5) TO INCREASE WORKABILITY OF THE CONCRETE CONSULTANTS APPROVED PLASTICIZER/ADMIXTURE MAY BE USED BY THE CONTRACTOR AT HIS OWN COST AFTER DETERMINING QUANTITY AT DESIGN MIX STAGE.
- 6) DESIGN MIX PREPARED UNDER LABORATORY CONDITIONS WILL SHOW CYLINDER STRENGTH 25% ABOVE THE REQUIRED WORKS STRENGTH OF THE FIELD CONCRETE.
- 7) MAXIMUM COARSE AGGREGATE SIZE SHALL BE AS FOLLOWS UNLESS, OTHERWISE APPROVED BY THE ENGINEER
 - * 3/4" FOR FOUNDATIONS, COLUMNS, BEAMS & WALLS
 - * 1/2" FOR SLABS
 - * 3/8" FOR WAFFLE SLABS
 MINIMUM CONCRETE COVER SHALL BE AS FOLLOWS UNLESS OTHERWISE SPECIFIED.

D) CONCRETE COVER

STRUCTURAL ELEMENT	BAR CATEGORY	MIN. CONCRETE COVER
PILES, PILECAPS (Concrete cast against and permanently exposed to earth.)	BOTTOM BARS	3"
	TOP & SIDE BARS	2"
BEAMS	LONGITUDINAL REINFORCEMENT	1 1/2"
	STIRRUPS	1"
COLUMNS	PRIMARY REINFORCEMENT TIES & SPIRALS	1 1/2"
OHWT (WALLS & SLABS)	SURFACE EXPOSED TO WATER / VAPOURS	1"
WAIST SLABS	TOP, BOTTOM & SIDES	1"
SLABS	TOP, BOTTOM & SIDES	3/4"

E) REINFORCING STEEL

- 1) ALL REINFORCING STEEL BARS SHALL BE ROLLED FROM PRIME GRADE PAKISTAN STEEL BILLETS. REINFORCEMENT ROLLED FROM SCRAP STEEL, SHIP PLATE OR RE-ROLLED BILLETS SHALL NOT BE USED.
- 2) BARS MARKED ON DRAWINGS AS "H" SHALL BE HIGH YIELD DEFORMED BARS WITH MINIMUM YIELD STRENGTH OF 410 N/mm² (APPROXIMATE 60,000 PSI) CONFORMING TO THE FOLLOWING STANDARDS: ASTM A615 GRADE 60 COLD DRAWN/ HOT ROLLED
- 3) BARS MARKED ON DRAWINGS AS "M" OR OTHERWISE UNMARKED SHALL BE PLAIN ROUND BARS WITH MINIMUM YIELD STRENGTH OF 250 N/mm² (APPROXIMATE 36,000 PSI) CONFORMING TO THE FOLLOWING STANDARDS: ASTM A615 GRADE 40 HOT ROLLED
- 4) UNLESS OTHERWISE SHOWN ON THE DRAWINGS, LAPS IN REINFORCING BARS SHALL BE STAGGERED MINIMUM LENGTH OF LAP SHALL BE AS FOLLOWS:

GRADE 60 BAR DIA. IN 1/8 MULTIPLE OF INCH	LAP SPLICE LENGTH FOR PILECAP WITH f_c' 3000 PSI.		LAP SPLICE LENGTH FOR COLUMNS & SHEAR WALLS	
	BARS AT ALL LOCATION EXCEPT TOP BARS	TOP	WITH f_c' 4000 PSI.	
NO.3	1'-10"	2'-4"	1'-7"	
NO.4	2'-6"	3'-1"	2'-1"	
NO.5	3'-0"	4'-0"	2'-7"	
NO.6	3-7"	4'-8"	3'-1"	
NO.8	6'-0"	7'-9"	5'-2"	

* TOP BAR MEANS HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCH OF FRESH CONCRETE IS CAST BELOW THE BAR BEING DEVELOPED OR SPLICED.

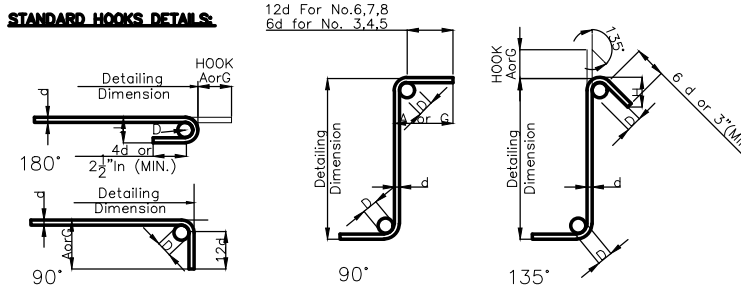
5) REINFORCEMENT IN MEMBERS RESISTING EARTHQUAKE-INDUCED FORCES

REINFORCEMENT RESISTING EARTHQUAKE-INDUCED FLEXURAL AND AXIAL FORCES IN FRAME MEMBERS AND IN STRUCTURAL WALL BOUNDARY ELEMENTS SHALL COMPLY WITH ASTM A706. ASTM A 615 GRADE 40 AND 60 REINFORCEMENT SHALL BE PERMITTED IN THESE MEMBERS IF:

- a) THE ACTUAL YIELD STRENGTH BASED ON MILL TESTS DOES NOT EXCEED FY BY MORE THAN 18,000 PSI (RETESTS SHALL NOT EXCEED THIS VALUE BY MORE THAN AN ADDITIONAL 3000 PSI); AND
- b) THE RATIO OF THE ACTUAL TENSILE STRENGTH TO THE ACTUAL YIELD STRENGTH IS NOT LESS THAN 1.25.

THE VALUE OF FYT FOR TRANSVERSE REINFORCEMENT INCLUDING SPIRAL REINFORCEMENT SHALL NOT EXCEED 60,000 PSI.

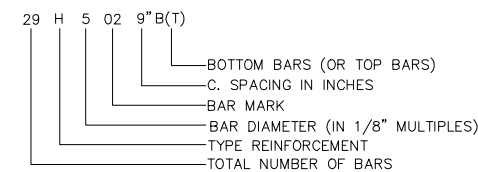
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BAR DIA "d" (INCHES)	D (INCHES)	A or G (INCHES)		BAR DIA "d" (INCHES)	D (INCHES)	A or G (INCHES)	J (INCHES)	BAR DIA "d" (INCHES)	D (INCHES)	A or G (INCHES)	H (INCHES)
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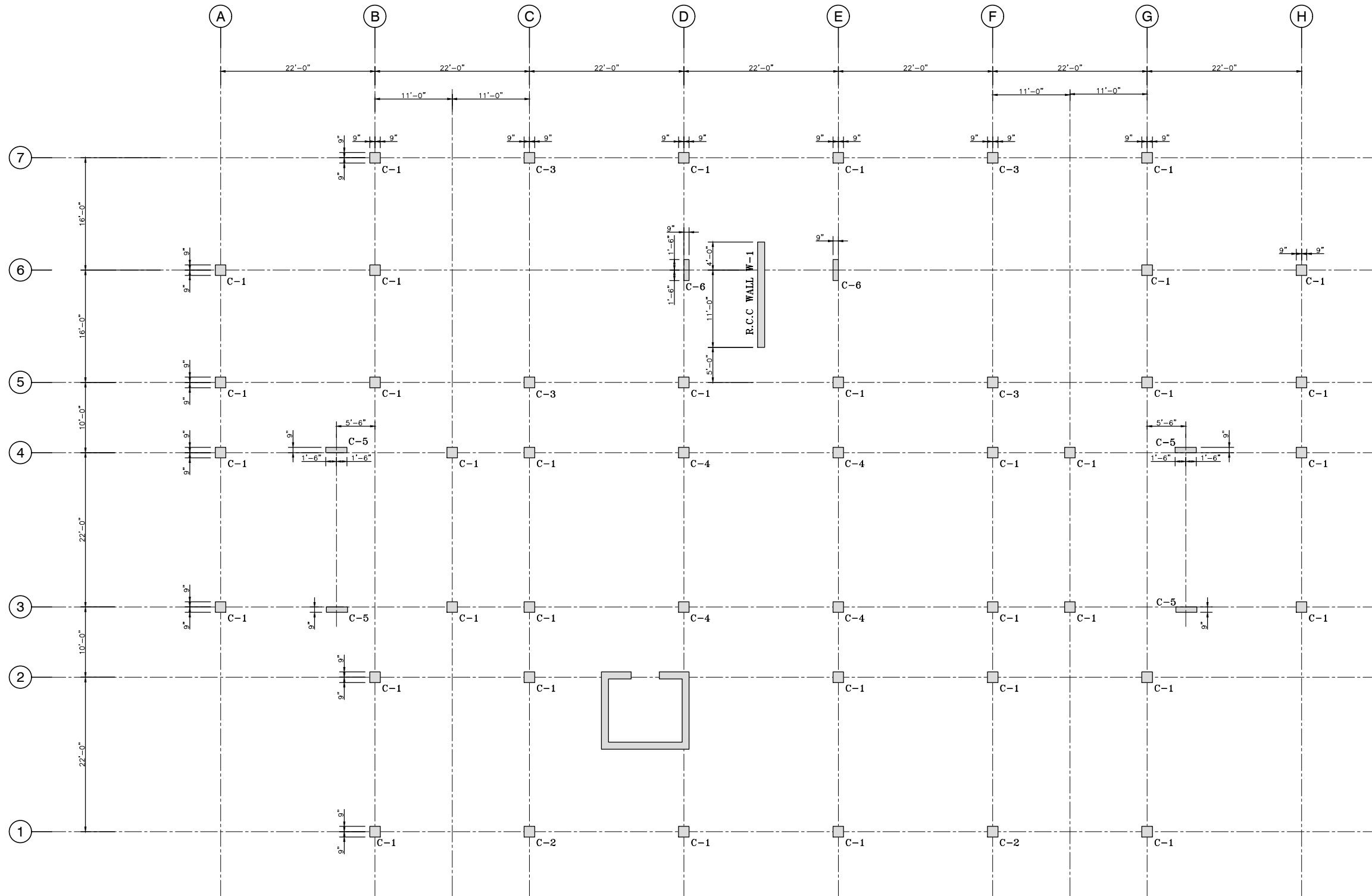
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ISSUE FOR TENDER

(JOB NO. 19/18)

S.NO.	DRG.NO.	DRAWING TITLE	REVISION
01	IBA/CCJ/GN-01	GENERAL NOTES	0
02	IBA/CCJ/S-01	COLUMN LAYOUT PLAN PLAN	0
03	IBA/CCJ/S-02	PILE LAYOUT PLAN	0
04	IBA/CCJ/S-03	REINFORCEMENT DETAILS OF PILE CAP (SHEET-1)	0
05	IBA/CCJ/S-04	REINFORCEMENT DETAILS OF PILE CAP (SHEET-2)	0
06	IBA/CCJ/S-05	DETAILS OF COLUMN	0
07	IBA/CCJ/S-06	PLINTH BEAM PLAN @ LEV. +2'-3"	0
08	IBA/CCJ/S-07	PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3" (SHEET-1)	0
09	IBA/CCJ/S-08	PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3" (SHEET-2)	0
10	IBA/CCJ/S-09	PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3" (SHEET-3)	0
11	IBA/CCJ/S-10	FIRST FLOOR FRAMING PLAN @ LEV. +14'-3"	0
12	IBA/CCJ/S-11	FIRST FLOOR REINFORCEMENT PLAN @ LEV. +14'-3"	0
13	IBA/CCJ/S-12	FIRST FLOOR BEAM ELEVATION & SECTION @ LEV. +14'-3" (SHEET-1)	0
14	IBA/CCJ/S-13	FIRST FLOOR BEAM ELEVATION & SECTION @ LEV. +14'-3" (SHEET-2)	0
15	IBA/CCJ/S-14	ROOF FRAMING PLAN @ LEV. +26'-3"	0
16	IBA/CCJ/S-15	ROOF REINFORCEMENT PLAN @ LEV. +26'-3"	0
17	IBA/CCJ/S-16	ROOF BEAM ELEVATION & SECTIONS @ LEV. +26'-3" (SHEET-1)	0
18	IBA/CCJ/S-17	ROOF BEAM ELEVATION & SECTIONS @ LEV. +26'-3" (SHEET-2)	0
19	IBA/CCJ/S-18	DETAIL OF O/H.W.TANK	0



COLUMN LAYOUT PLAN
SCALE: 3/16" = 1'-0"

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/JC-01.

FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

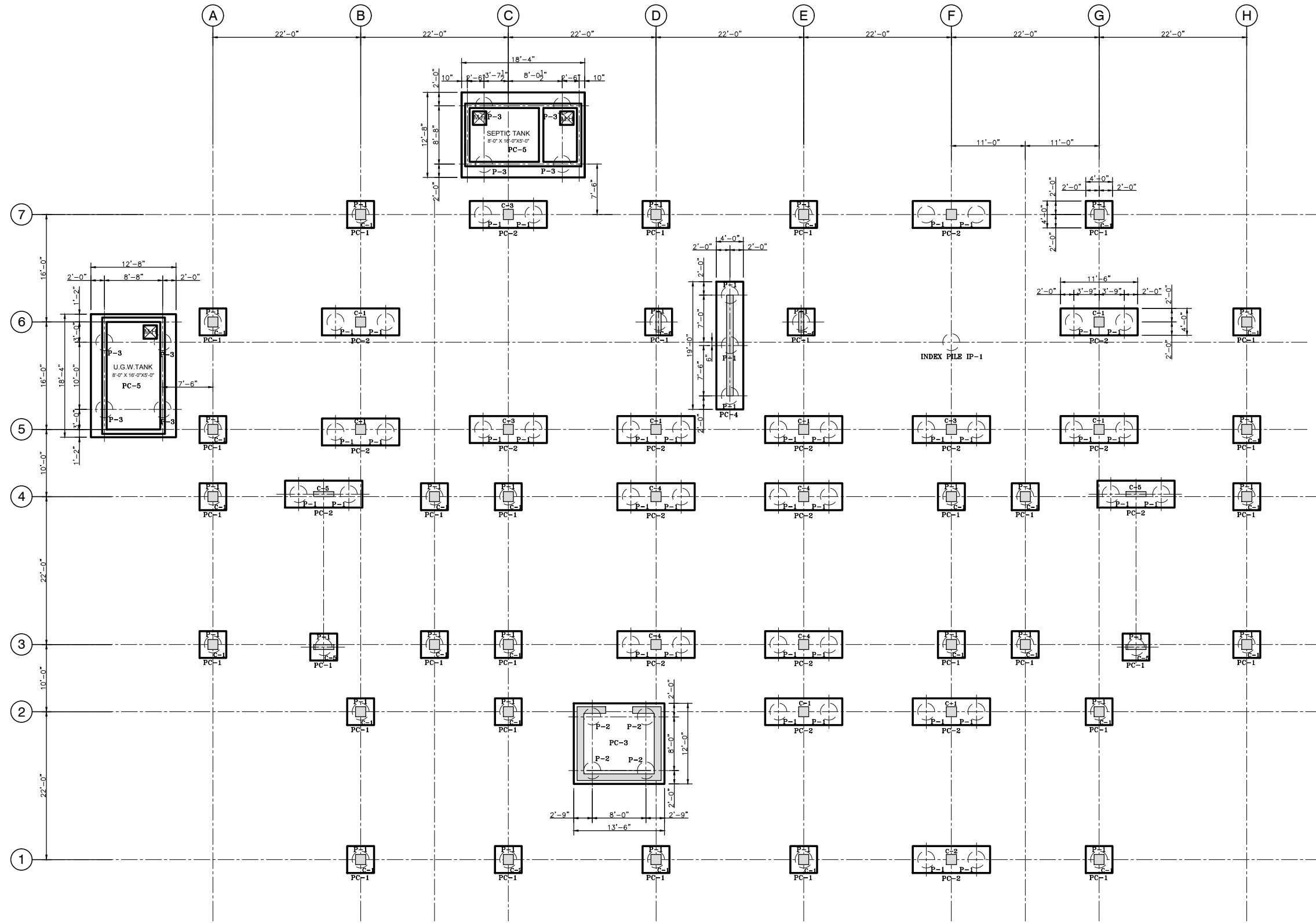
ARCHITECT:
HABIB FIDA ALI
4 CH, KHALIQUZZAMAN ROAD, KARACHI 75530
TEL: 5661 683, 5661 684, FAX: 92-21-5686891

CONSULTANT:
Loya associates
CONSULTING ENGINEERS, ARCHITECTS & PLANNERS
180-C, Block-2, P.E.C.H.S.Off Shara-e-Faisal/Shahrah-e-Quaiden
P.O. Box No.18833, Karachi-76400, Pakistan. Phone: (92-21)4836100-48,
Fax : (92-21)4834086, Email: info@loyaassociates.com,
URL : www.loyaassociates.com

REV	DATE	DESCRIPTION	APPROVED
0	18-01-19	FIRST ISSUE (FOR TENDER)	K.A

DRG. TITLE:
COLUMN LAYOUT PLAN

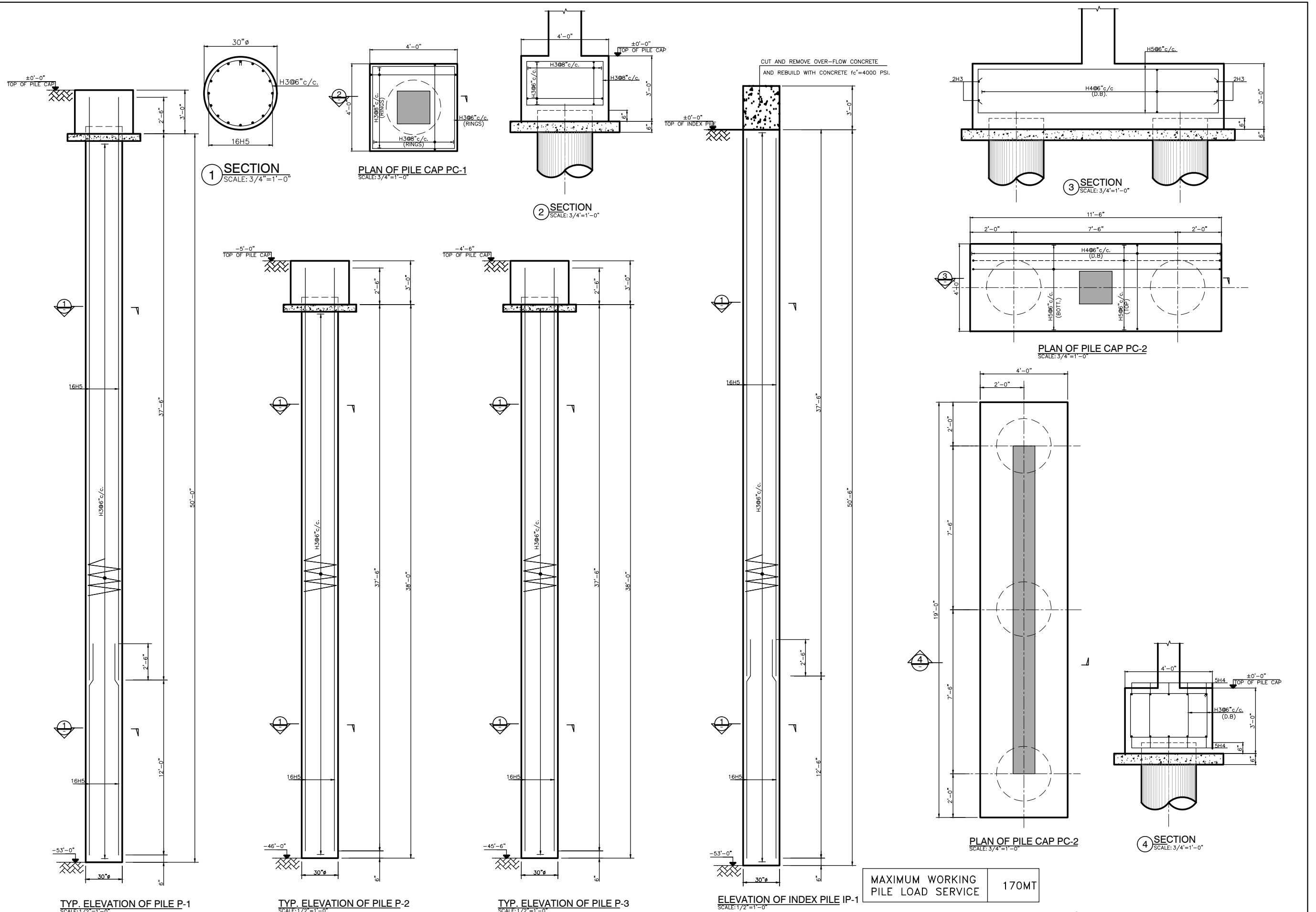
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CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CCJS-01
DATE	JAN '19	REV.	0



COLUMN LAYOUT PLAN
SCALE: 3/16" = 1'-0"

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CCJ/SH-01. FOR TENDER

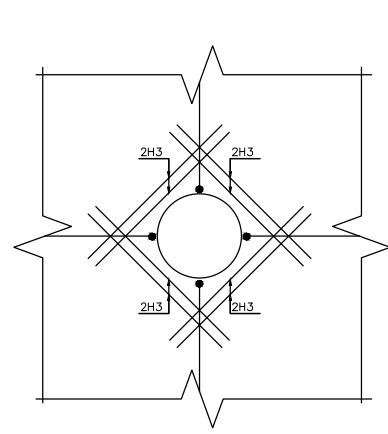
PROJECT : IBA COMMUNITY COLLEGE JACOBABAD	ARCHITECT: HABIB FIDA ALI 4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530 TEL: 5661683, 5661684, FAX: 92-21-5686891	CONSULTANT: Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 180-C, Block-2, P.E.C.H.E.S.O.N Sharon Faisal/Chakrah-e-Quaiden P.O. Box No.18688, Karachi-75400, Pakistan. Phone: (99-21)4686100-48. Fax : (99-21)4684088, Email: info@loyaassociates.com, URL : www.loyaassociates.com	DRG. TITLE:	DATE:	REV:	DESCRIPTION:	APPROVED:	DATE:	REV:	DESCRIPTION:	APPROVED:																
			PILE LAYOUT PLAN	19-01-19	0	FIRST ISSUE (FOR TENDER)	K.A																				
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DRAWN	FARIHAN SHAMIM	SCALE	AS SHOWN																								
CHECKED	A.F.	JOB NO.	19/18																								
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DATE	JAN. '19	REV.	0																								



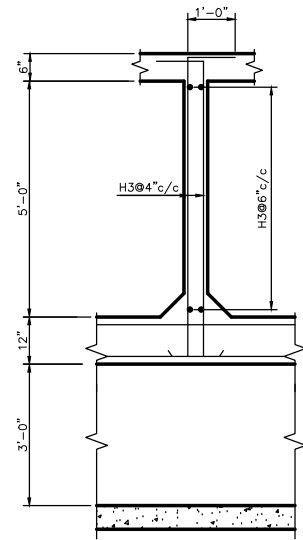
MAXIMUM WORKING PILE LOAD SERVICE 170MT

NOTE: 1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/EN-01. FOR TENDER

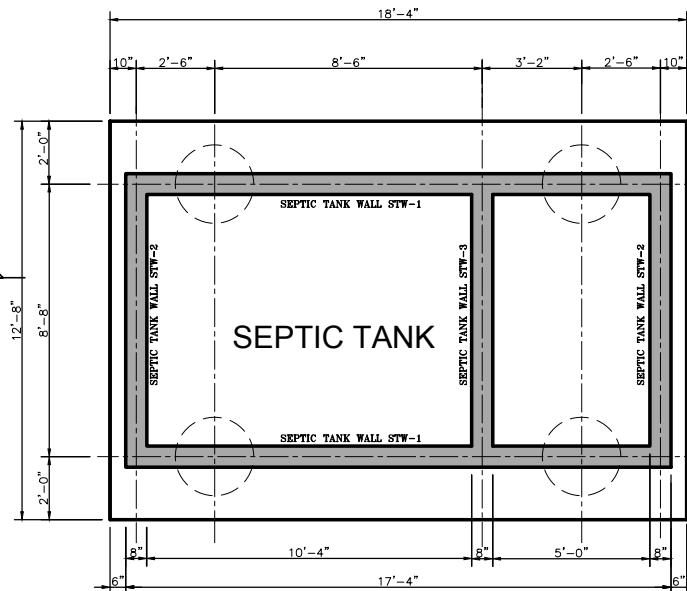
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IBA COMMUNITY COLLEGE JACOBABAD	HABIB FIDA ALI 4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530 TEL: 5661683, 5661684, FAX: 92-21-5686891	Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 180-C, Block-9, P.E.C.H.Q. Sharada Puri/Chakrab-9-Quaidon P.O. Box No. 12628, Karachi-75400, Pakistan. Phone: (99-21)4596100-48, Fax : (99-21)4594099, Email: info@loyaassociates.com, URL : www.loyaassociates.com	PILE CAP REINFORCEMENT DETAILS	19-01-19	0	FIRST ISSUE (FOR TENDER)	K.A.										
												DATE :	REV :	DESCRIPTION :	APPROVED :		
												JAN '19	0				



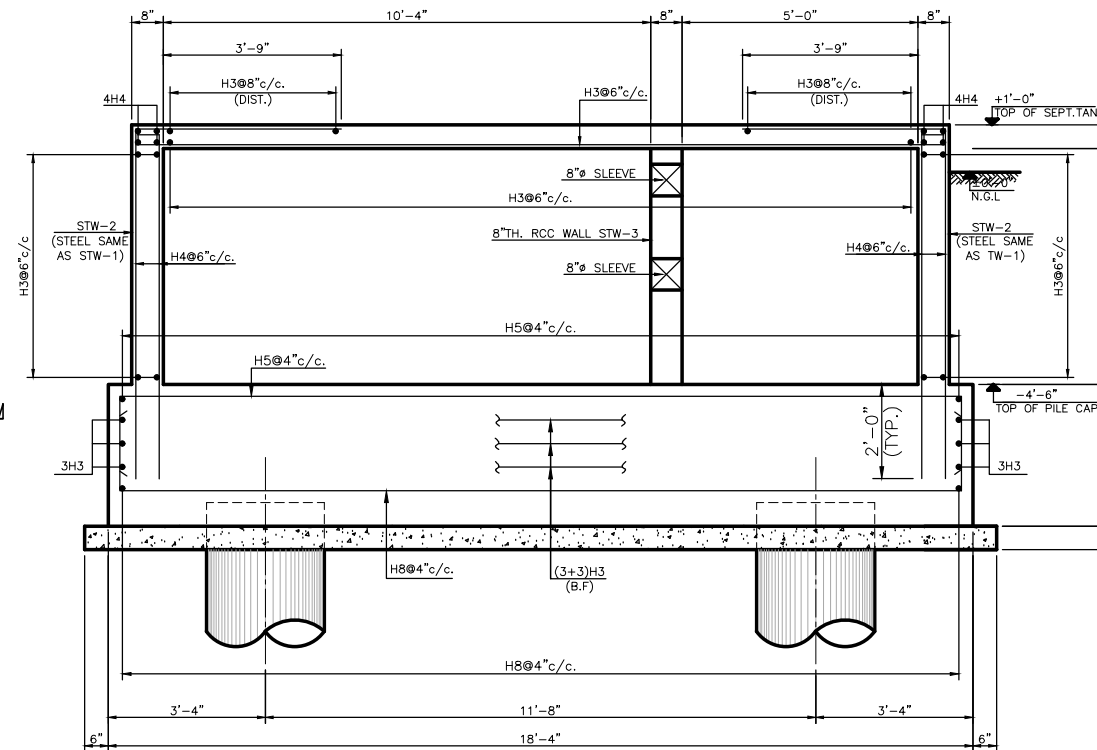
DETAILS OF SLEEVE
SCALE: 2/1=1'-0"



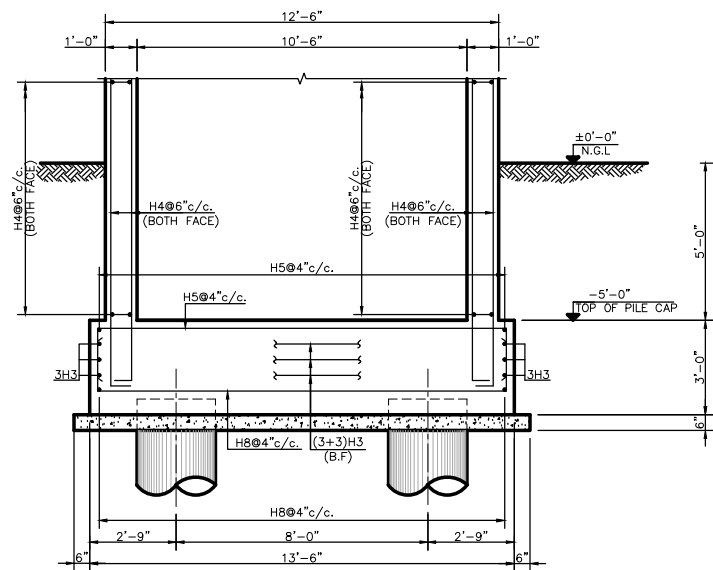
TYP. SEC. OF STW-3
SCALE: 3/4"=1'-0"



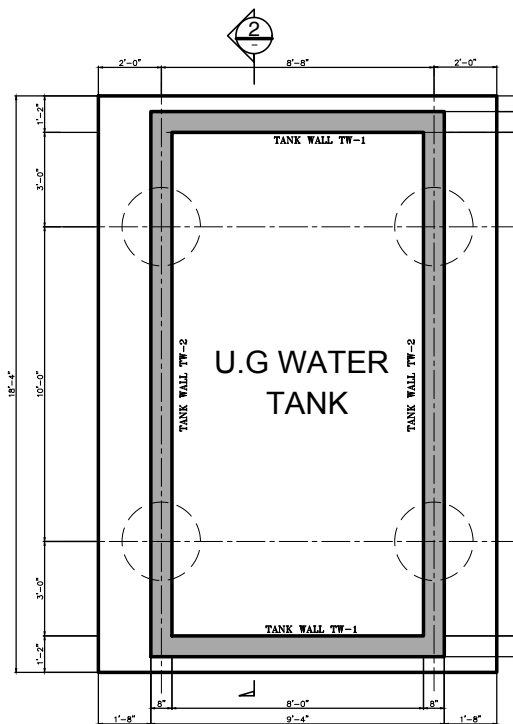
PLAN OF PILE CAP PC-5
SCALE: 1/2"=1'-0"



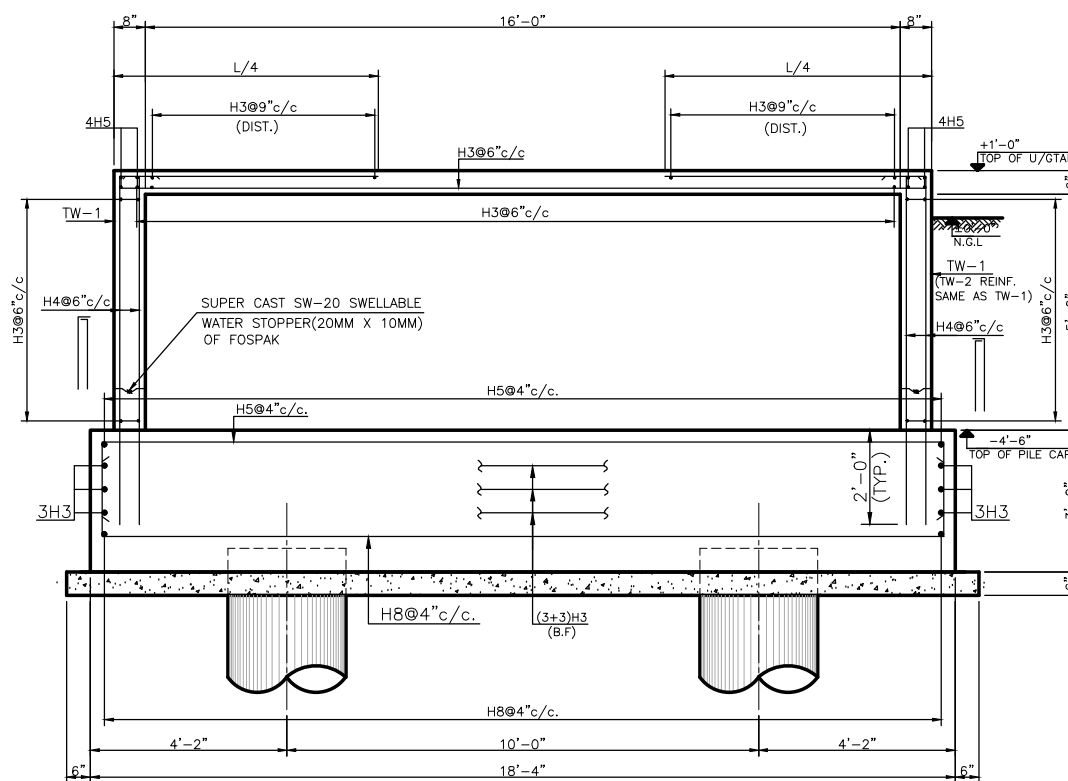
SECTION 3
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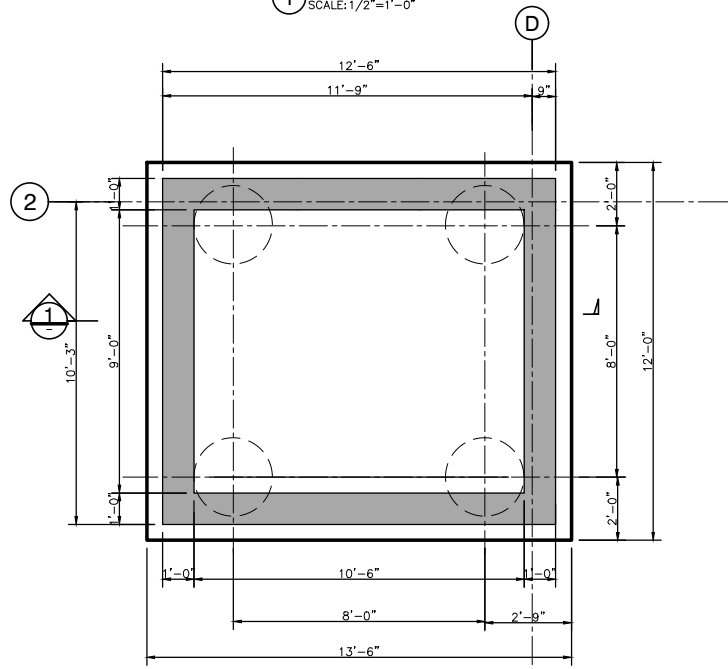
SECTION 1
SCALE: 1/2"=1'-0"



PLAN OF PILE CAP PC-5
SCALE: 1/2"=1'-0"



SECTION 2
SCALE: 3/4"=1'-0"



PLAN OF PILE CAP PC-3
SCALE: 1/2"=1'-0"

NOTE: 1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CCJ/GH-01. FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

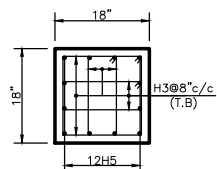
ARCHITECT:
HABIB FIDA ALI
4 CH, KHALIQUIZZAMAN ROAD, KARACHI 75530
TEL: 5661 683, 5661 684, FAX: 92-21-5686891

CONSULTANT:
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180-C, Block-2, P.E.C.H.S.Off Shara Faisal/Shahrah-e-Quaidon
P.O. Box No.18633, Karachi-75400, Pakistan. Phone: (99-21)4036100-45,
Fax : (99-21)4534086, Email: info@loyaassociates.com,
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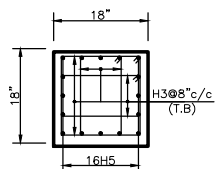
DRG. TITLE:
PILE CAP REINFORCEMENT DETAILS
(SHEET-2)

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CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CCJ/S-04
DATE	JAN '19	REV.	0

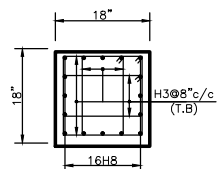
REV	DATE	DESCRIPTION	APPROVED
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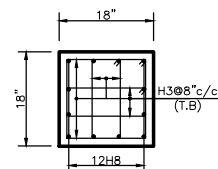
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SCALE: 1"=1'-0"



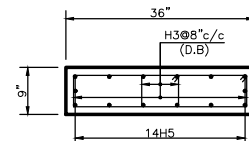
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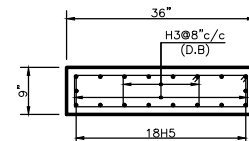
3 SECTION
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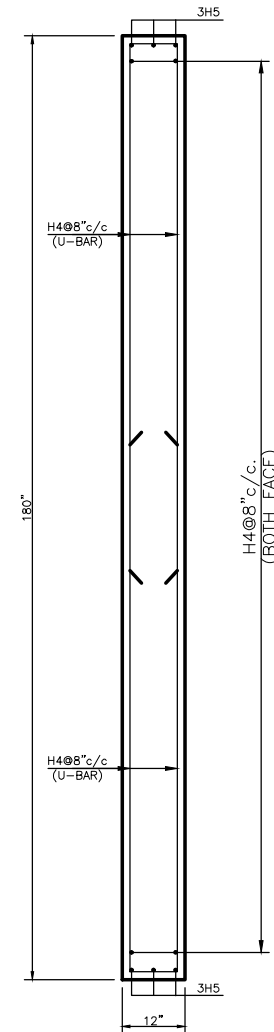
4 SECTION
SCALE: 1"=1'-0"



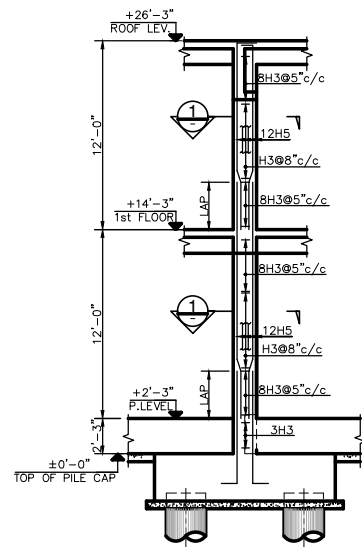
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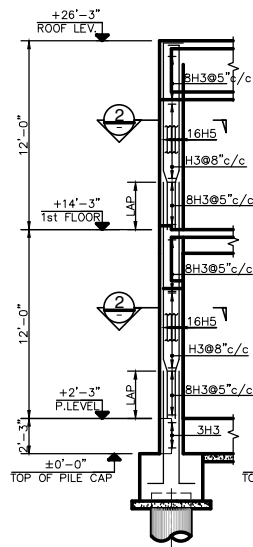
6 SECTION
SCALE: 1"=1'-0"



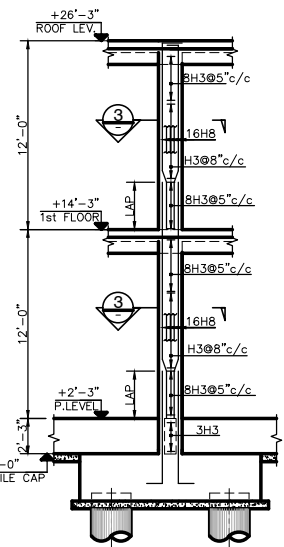
SEC. OF WALL W-1
SCALE: 1"=1'-0"



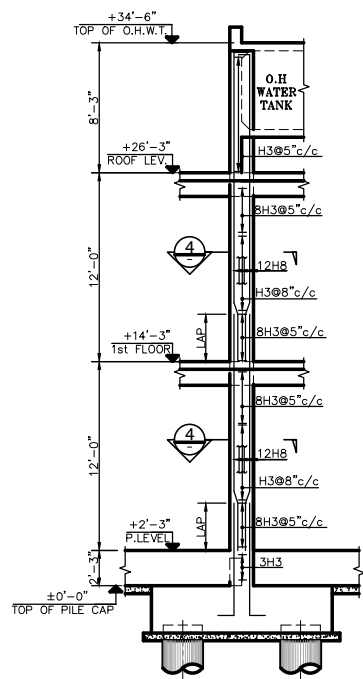
ELEVATION OF C-1
(18x18) SCALE: 1/4"=1'-0"



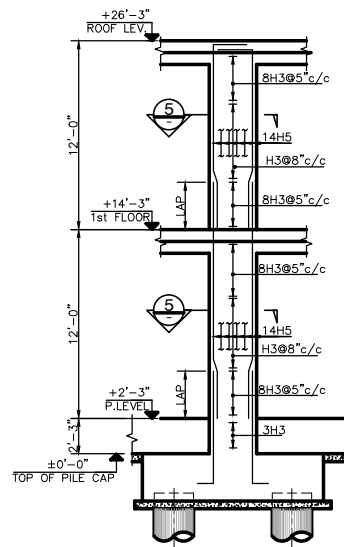
ELEVATION OF C-2
(18x18) SCALE: 1/4"=1'-0"



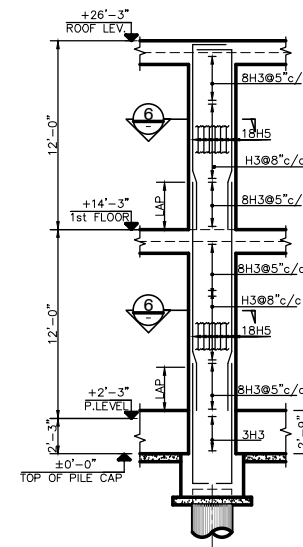
ELEVATION OF C-3
(18x18) SCALE: 1/4"=1'-0"



ELEVATION OF C-4
(18x18) SCALE: 1/4"=1'-0"



ELEVATION OF C-5
(9x36) SCALE: 1/4"=1'-0"



ELEVATION OF C-6
(9x36) SCALE: 1/4"=1'-0"

NOTE: 1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/04/01-01. FOR TENDER

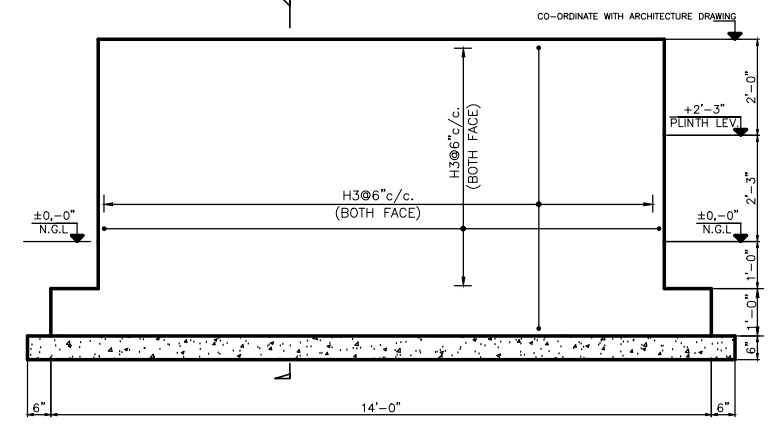
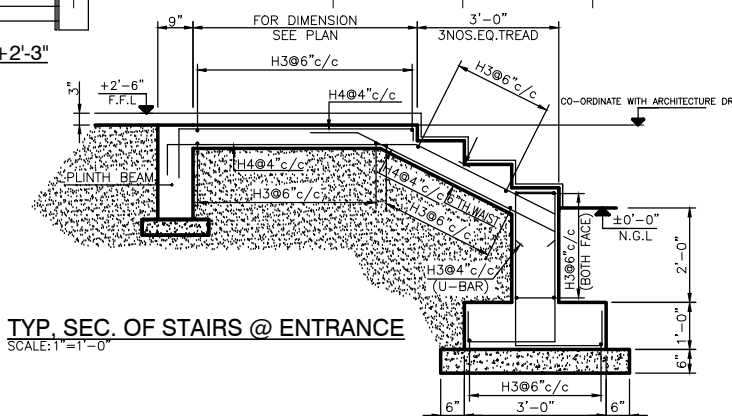
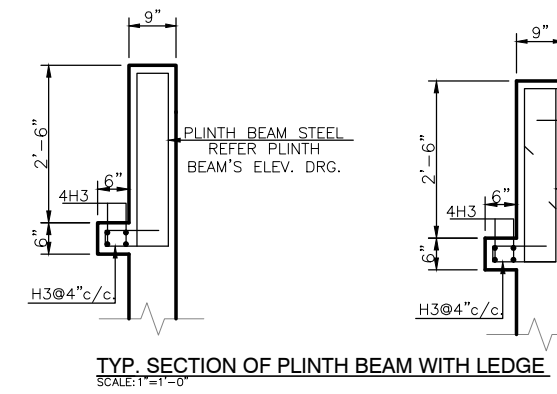
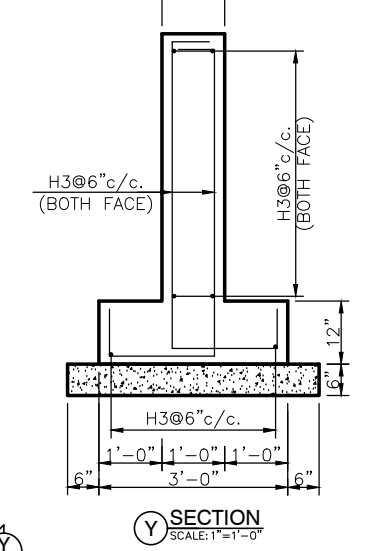
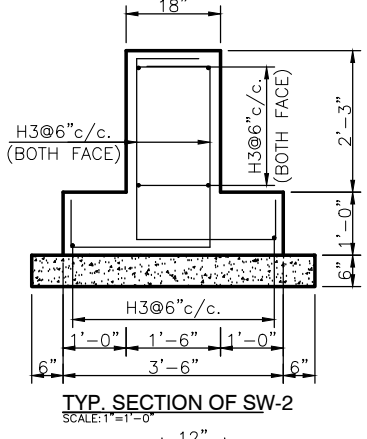
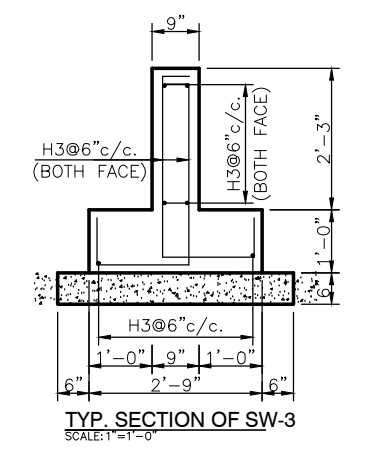
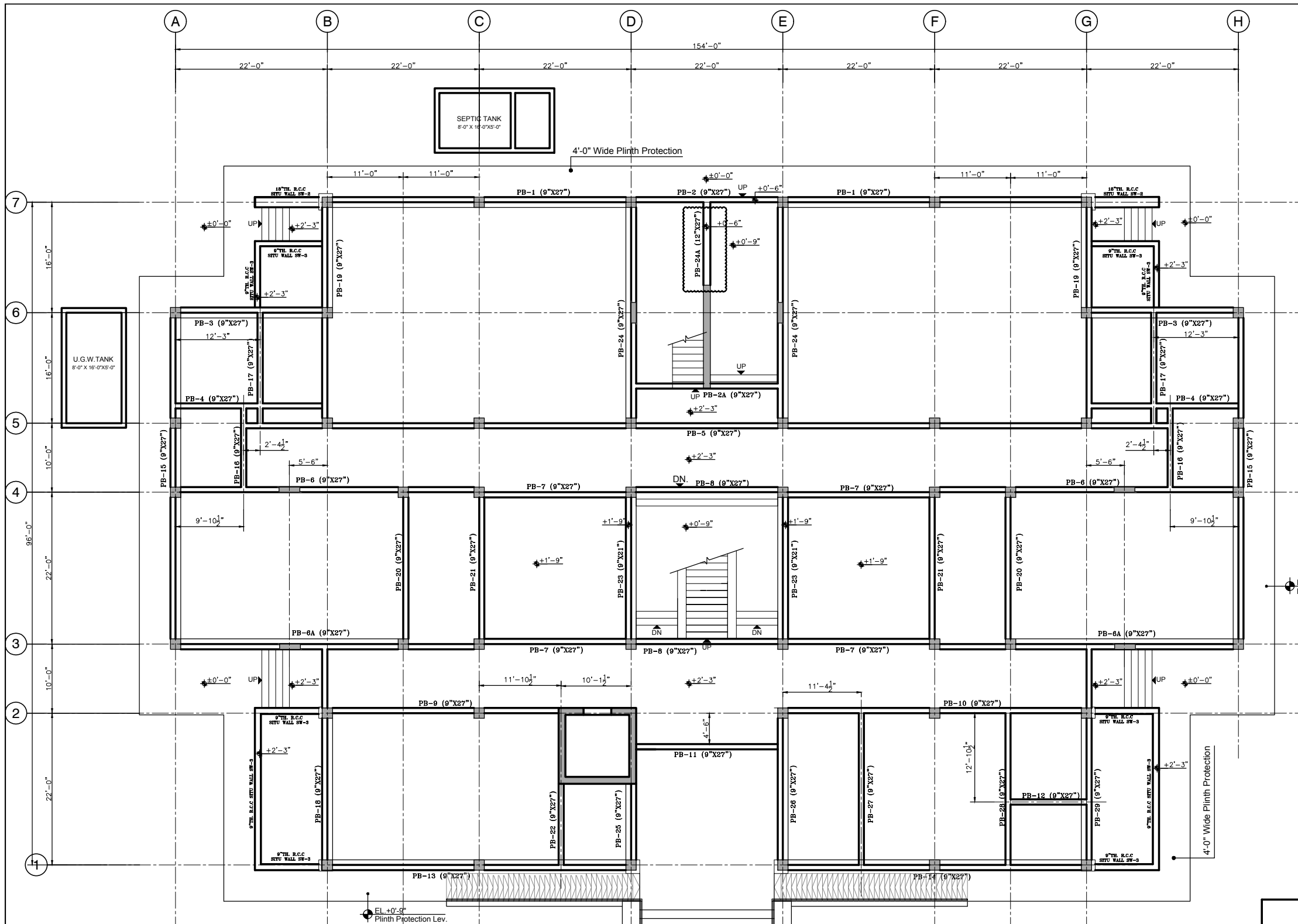
PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

ARCHITECT:
HABIB FIDA ALI
4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530
TEL: 5661683,5661684, FAX:92-21-5686891

CONSULTANT:
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P.O. Box No.18633,Karachi-76400,Pakistan.Phone:(92-21)4636100-48,
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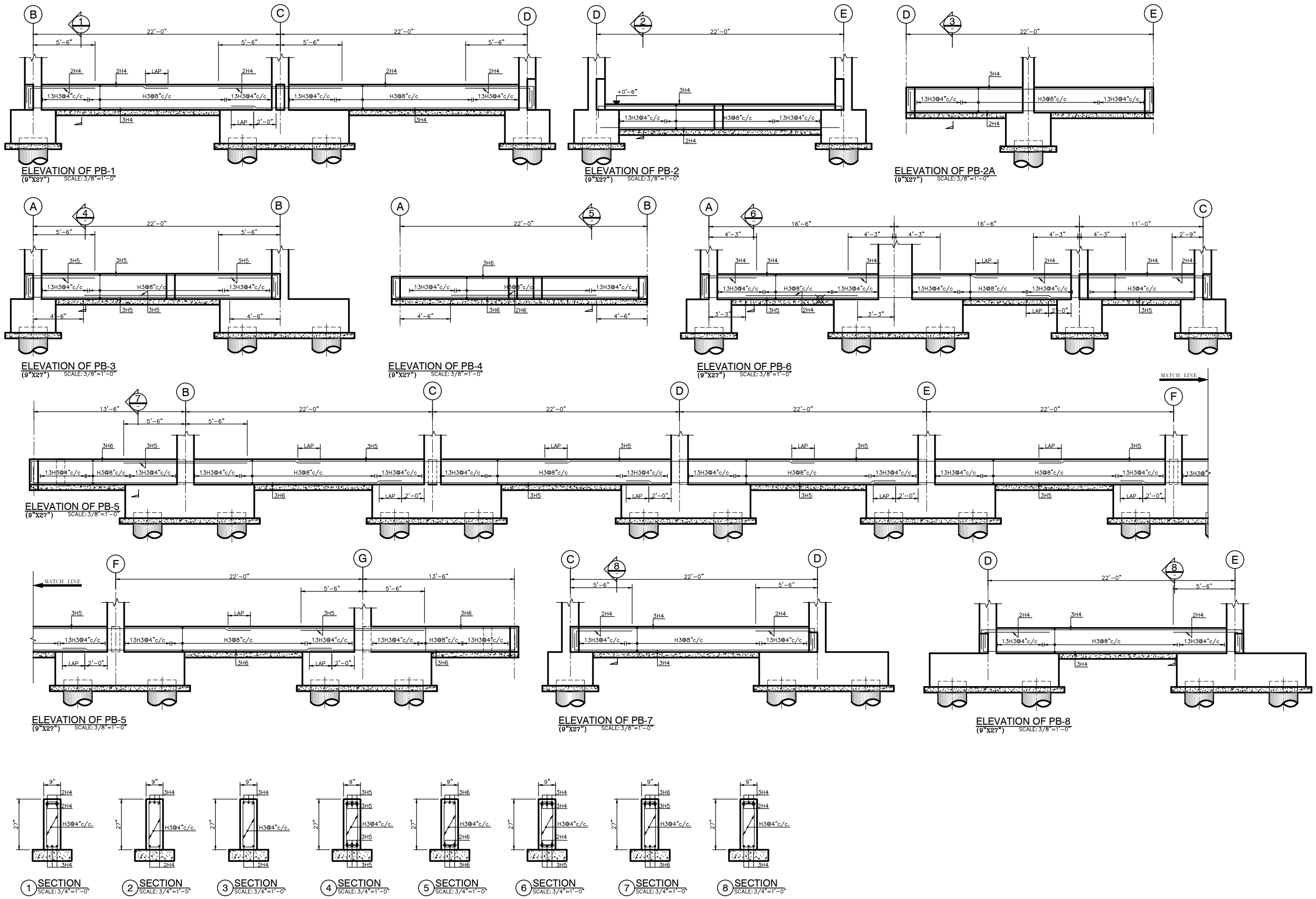
DRG. TITLE:
DETAILS OF COLUMN

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APPROVED	K.A.	DRG NO.	IBA/CCJS-05
DATE	JAN '19	REV.	0



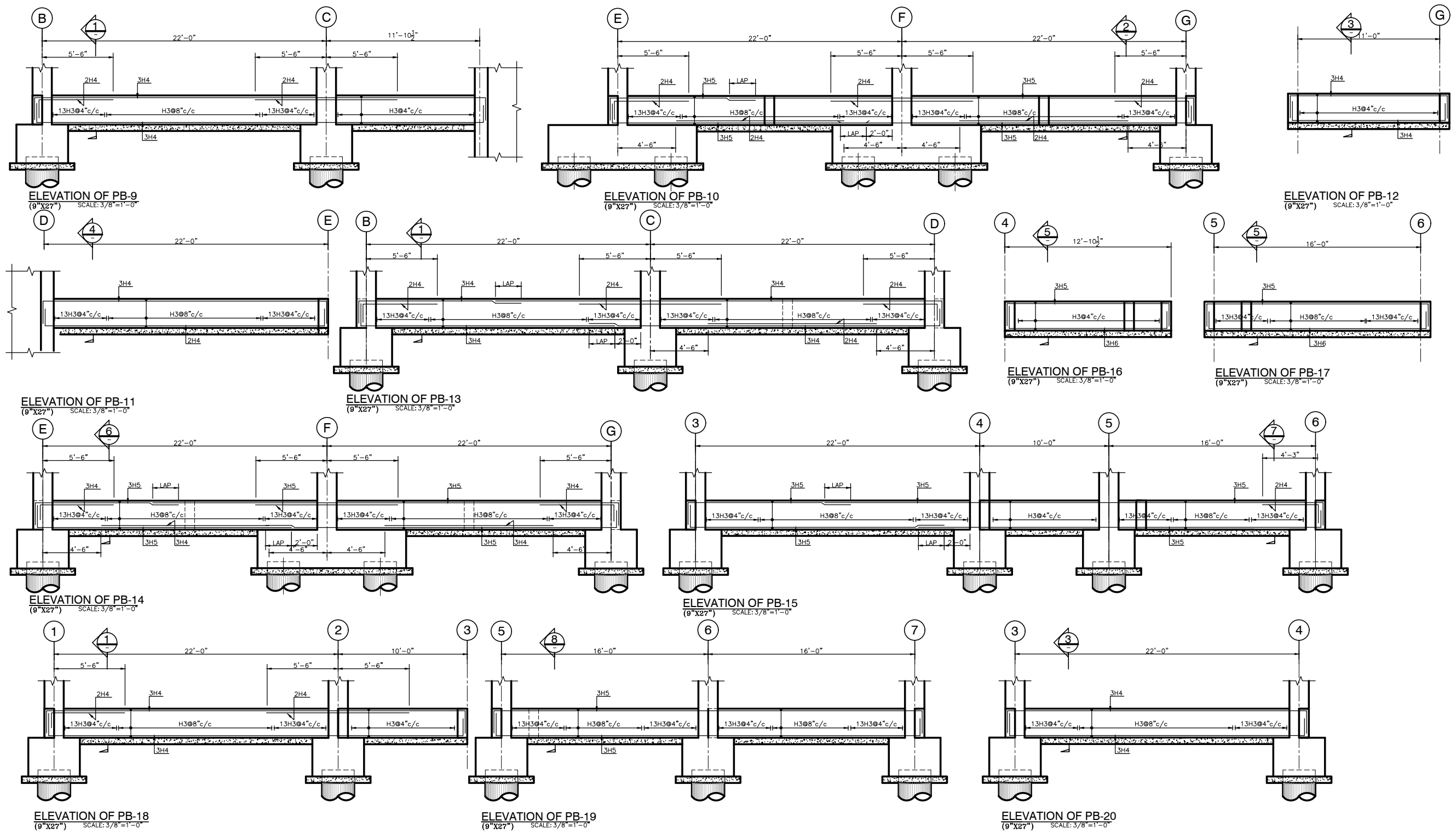
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PROJECT :	ARCHITECT :	CONSULTANT :	DRG. TITLE :	<table border="1"> <tr> <th>REV</th> <th>DATE</th> <th>DESCRIPTION</th> <th>APPROVED</th> </tr> <tr> <td>0</td> <td>15-09-21</td> <td>ISSUE</td> <td>KA</td> </tr> </table>	REV	DATE	DESCRIPTION	APPROVED	0	15-09-21	ISSUE	KA								
REV	DATE	DESCRIPTION	APPROVED																	
0	15-09-21	ISSUE	KA																	
IBA COMMUNITY COLLEGE JACOBABAD	HABIB FIDA ALI 4 CH, KHALIQUIZZAMAN ROAD, KARACHI 75530 TEL: 5661683,5661684, FAX:92-21-5686891	Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 100-C, Block-2, P.E.C.H.S.Off Sharea Faisal/Shaheed-e-Quaiden P.O. Box No.18633,Karachi-75400,Pakistan.Phone:(92-21)4636100-48, Fax : (92-21)4634088, Email:info@loyaassociates.com, URL : www.loyaassociates.com	PLINTH BEAM PLAN @ LEV.+2'-3"	<table border="1"> <tr> <th>DRAWN</th> <th>MADEEN RAHAT</th> <th>SCALE</th> <th>AS SHOWN</th> </tr> <tr> <th>CHECKED</th> <td>A.F.</td> <td>JOB NO.</td> <td>19/18</td> </tr> <tr> <th>APPROVED</th> <td>K.A.</td> <td>DRG NO.</td> <td>IBA/CCJ/S-06</td> </tr> <tr> <th>DATE</th> <td>SEPT. '21</td> <td>REV.</td> <td>0</td> </tr> </table>	DRAWN	MADEEN RAHAT	SCALE	AS SHOWN	CHECKED	A.F.	JOB NO.	19/18	APPROVED	K.A.	DRG NO.	IBA/CCJ/S-06	DATE	SEPT. '21	REV.	0
DRAWN	MADEEN RAHAT	SCALE	AS SHOWN																	
CHECKED	A.F.	JOB NO.	19/18																	
APPROVED	K.A.	DRG NO.	IBA/CCJ/S-06																	
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NOTE:
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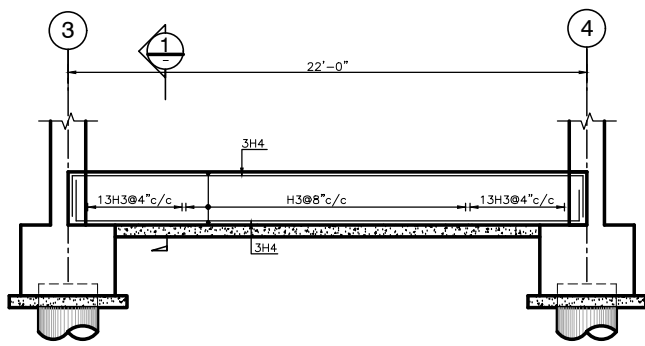
PROJECT :		ARCHITECT :		CONSULTANT :		DRG. TITLE :		FOR TENDER	
IBA COMMUNITY COLLEGE JACOBABAD		HABIB FIDA ALI 4 CH. KHALIQUIZZAMAN ROAD, KARACHI 75530 TEL: 5661 683, 5661 684, FAX: 92-21-5686891		Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 100-C, Block-2, P.E.C.H.S.Off Sharae Faisal/Shahrah-e-Quaidoon P.O. Box No.18633, Karachi-76400, Pakistan. Phone: (99-21)4036100-48, Fax : (99-21)4034088, Email: info@loyaassociates.com, URL : www.loyaassociates.com		PLINTH BEAM ELEVATION & SECTIONS @ LEV. +2'-3"		DATE JAN '19	
0		10-01-19		FIRST ISSUE (FOR TENDER)		K.A		SCALE AS SHOWN	
REV		DATE		DESCRIPTION		APPROVED		JOB NO. 19/18	
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								REV. 0	



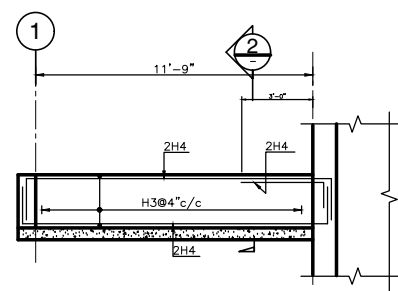
NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC4/GN-01.

FOR TENDER

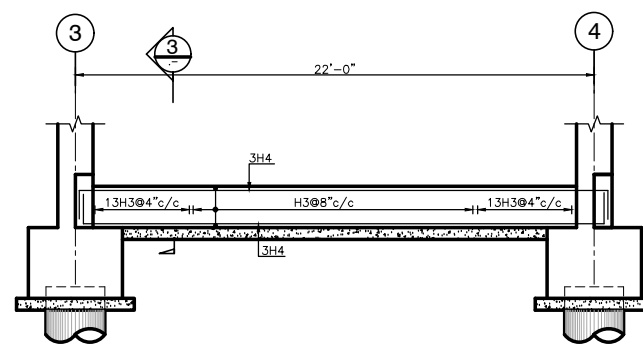
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DRAWN	FARHAN SHAHMI	SCALE	AS SHOWN																	
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DATE	JAN '19	REV.	0																	
IBA COMMUNITY COLLEGE JACOBABAD	HABIB FIDA ALI 4 CH. KHAIQUIZZAMAN ROAD, KARACHI 75530 TEL: 5661683,5661684, FAX:92-21-5686891	Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 180-C, Block-2, P.E.C.H.S.Off Sharae Faisal/Shahrah-e-Quaidon P.O. Box No.18633,Karachi-76400,Pakistan.Phone:(92-21)4836100-48, Fax : (92-21)4834088, Email:info@loyaassociates.com, URL : www.loyaassociates.com	PLINTH BEAM ELEVATION & SECTIONS @LEV.+2'-3" (SHEET-2)																	
0 18-01-19 FIRST ISSUE (FOR TENDER) K.A. REV DATE DESCRIPTION APPROVED THIS DRAWING SUPERSEDES ALL ITS PREVIOUS ISSUES BEARING LOWER REVISION NUMBERS.																				



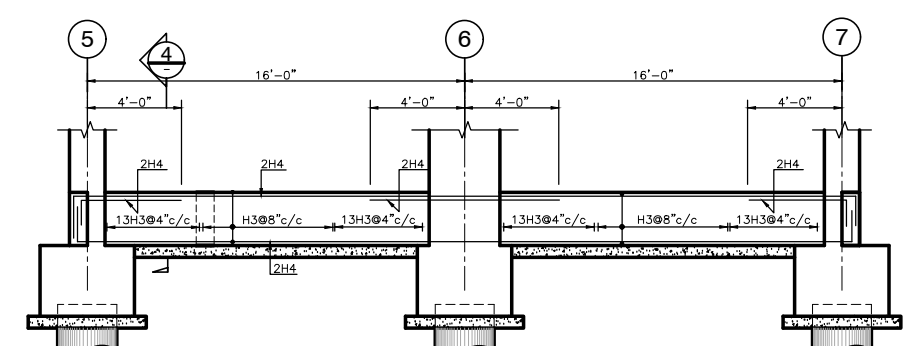
ELEVATION OF PB-21
(9" X 27") SCALE: 3/8"=1'-0"



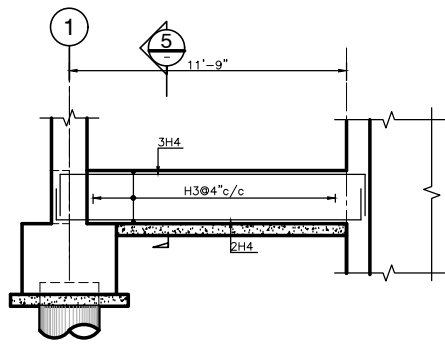
ELEVATION OF PB-22
(9" X 27") SCALE: 3/8"=1'-0"



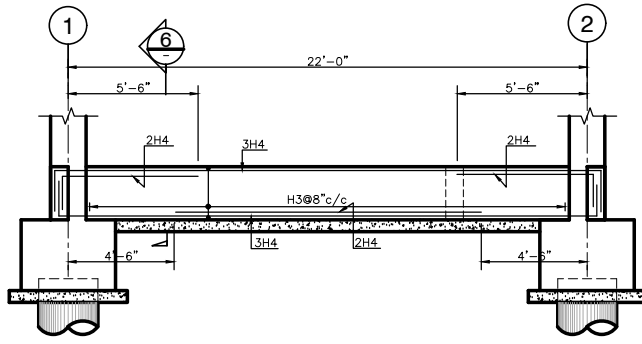
ELEVATION OF PB-23
(9" X 21") SCALE: 3/8"=1'-0"



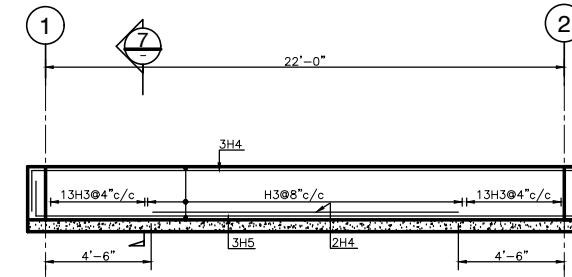
ELEVATION OF PB-24
(9" X 27") SCALE: 3/8"=1'-0"



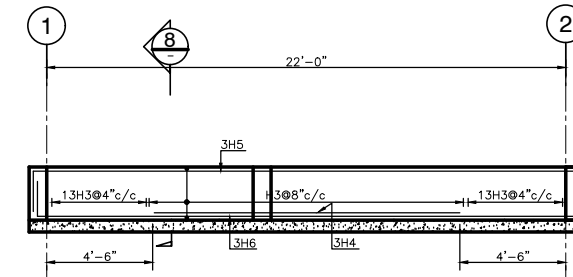
ELEVATION OF PB-25
(9" X 27") SCALE: 3/8"=1'-0"



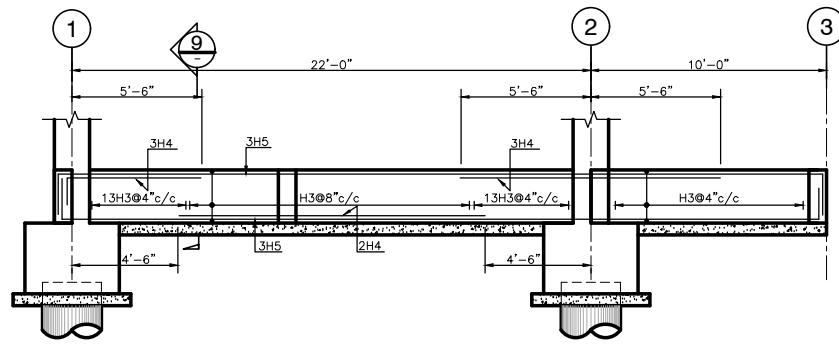
ELEVATION OF PB-26
(9" X 27") SCALE: 3/8"=1'-0"



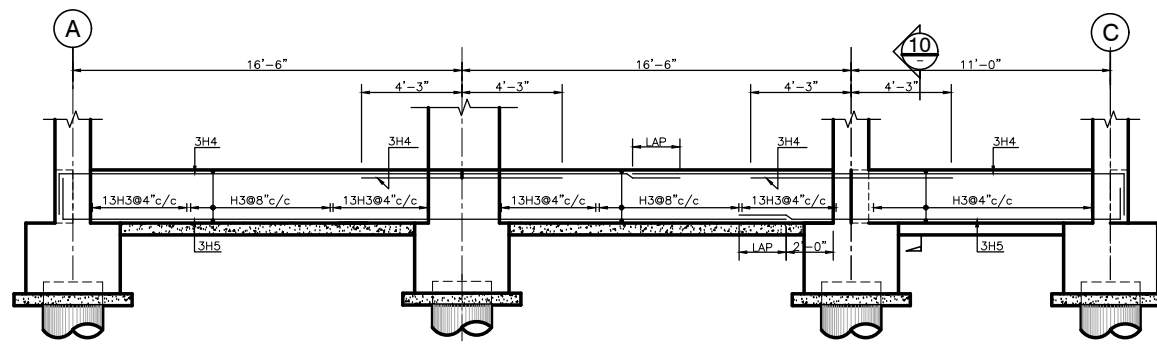
ELEVATION OF PB-27
(9" X 27") SCALE: 3/8"=1'-0"



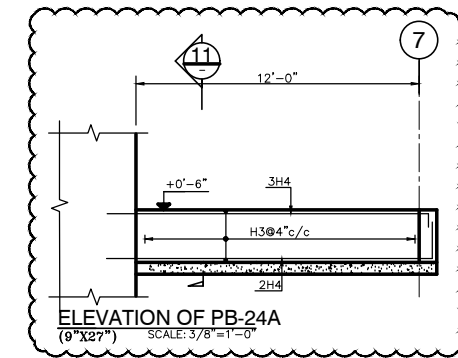
ELEVATION OF PB-28
(9" X 27") SCALE: 3/8"=1'-0"



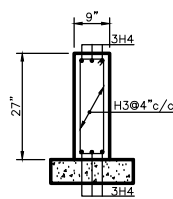
ELEVATION OF PB-29
(9" X 27") SCALE: 3/8"=1'-0"



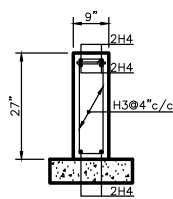
ELEVATION OF PB-6A
(9" X 27") SCALE: 3/8"=1'-0"



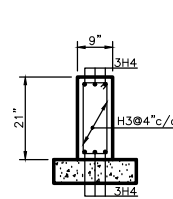
ELEVATION OF PB-24A
(9" X 27") SCALE: 3/8"=1'-0"



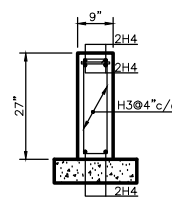
1 SECTION
SCALE: 3/4"=1'-0"



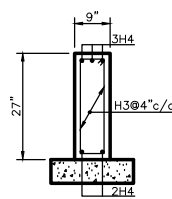
2 SECTION
SCALE: 3/4"=1'-0"



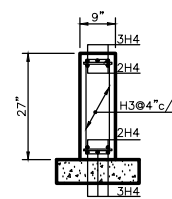
3 SECTION
SCALE: 3/4"=1'-0"



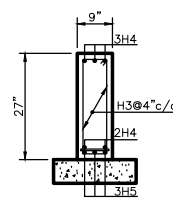
4 SECTION
SCALE: 3/4"=1'-0"



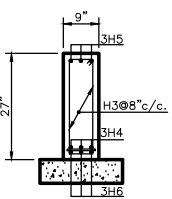
5 SECTION
SCALE: 3/4"=1'-0"



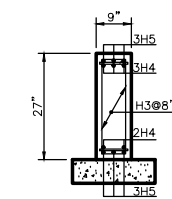
6 SECTION
SCALE: 3/4"=1'-0"



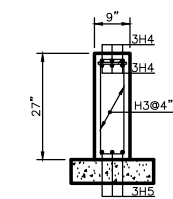
7 SECTION
SCALE: 3/4"=1'-0"



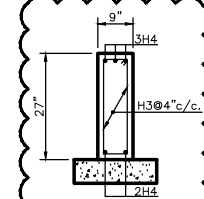
8 SECTION
SCALE: 3/4"=1'-0"



9 SECTION
SCALE: 3/4"=1'-0"



10 SECTION
SCALE: 3/4"=1'-0"



11 SECTION
SCALE: 3/4"=1'-0"

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/J/01-01. FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

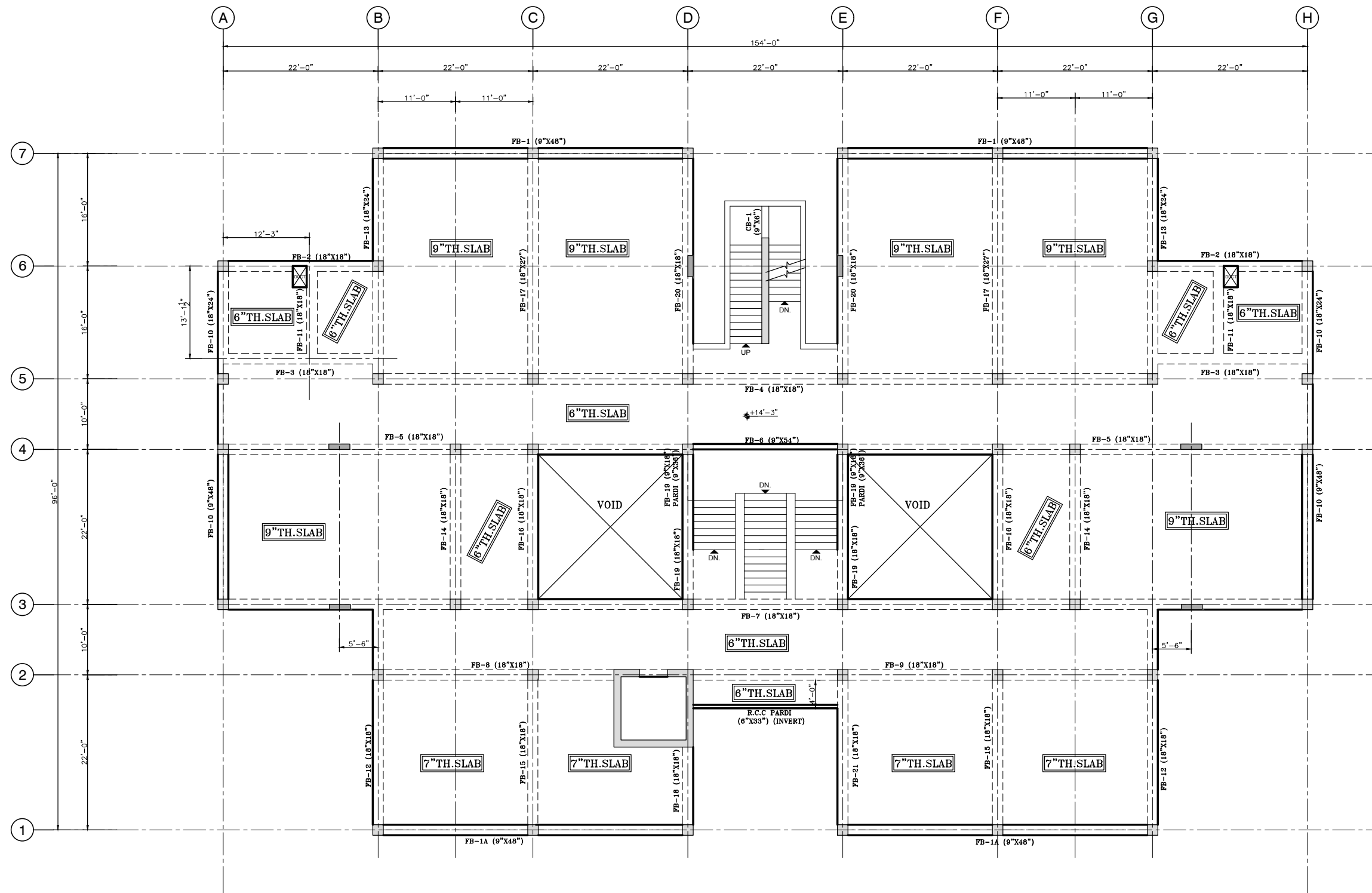
ARCHITECT:
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CONSULTANT:
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CONSULTING ENGINEERS, ARCHITECTS & PLANNERS
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P.O. Box No.18633, Karachi-75400, Pakistan. Phone: (92-21)4836100-48,
Fax : (92-21)4834088, Email: info@loyaassociates.com,
URL : www.loyaassociates.com

REV	DATE	DESCRIPTION	APPROVED
0	18-01-19	FIRST ISSUE (FOR TENDER)	K.A

DRG. TITLE:
**PLINTH BEAM ELEVATION & SECTIONS
@ LEV. +2'-3"**
(SHEET-3)

DRWN	FARHAN SHAMM	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CC/J/09
DATE	JAN '19	REV.	0



FIRST FLOOR FRAMING PLAN @ LEV. +14'-3"
SCALE: 3/16"=1'-0"

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. BA/CC/04/01-01.

FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

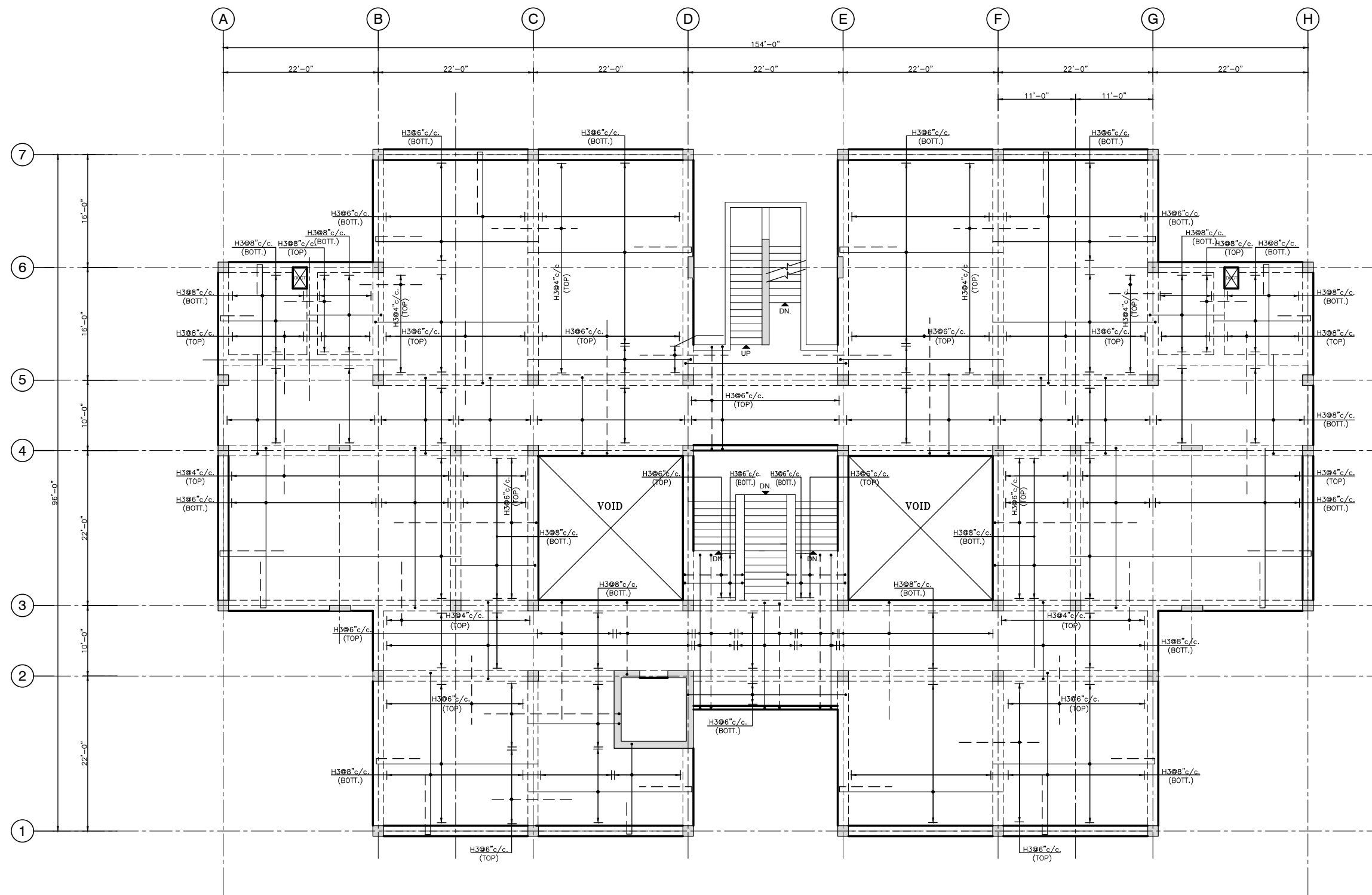
ARCHITECT:
HABIB FIDA ALI
4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530
TEL: 5661 683, 5661 684, FAX: 92-21-5686891

CONSULTANT:
Loya associates
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URL : www.loyassociates.com

REV	DATE	DESCRIPTION	APPROVED
0	18-01-19	FIRST ISSUE (FOR TENDER)	K.A

DRG. TITLE:
**FIRST FLOOR FRAMING PLAN.
@ LEV. +14'-3"**

DRWN	FARHAN SHAMM	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	BA/CC/JS-10
DATE	JAN '19	REV.	0



FIRST FLOOR REINFRCEMENT PLAN @ LEV. +14'-3"
SCALE: 3/16"=1'-0"

NOTE:
• TOP DISTRIBUTION STEEL NOT SHOWN IN PLAN
PROVIDE H309 c/c. WHEREVER REQUIRED.

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. BA/CC/04/01-01.

FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

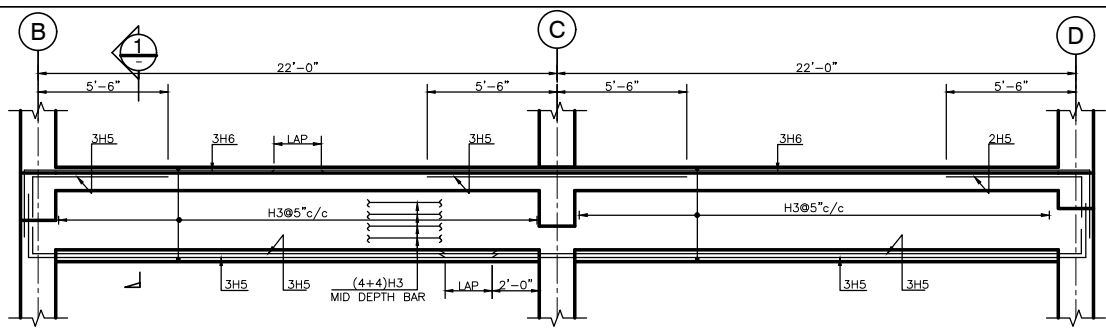
ARCHITECT:
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P.O. Box No.18633,Karachi-75400,Pakistan.Phone:(92-21)4036100-45,
Fax : (92-21)4034090, Email:info@loyaassociates.com,
URL : www.loyaassociates.com

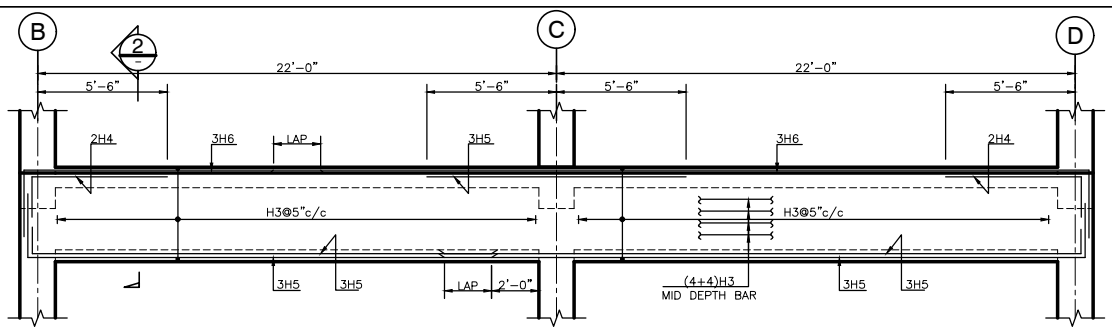
REV	DATE	DESCRIPTION	APPROVED
0	18-01-19	FIRST ISSUE (FOR TENDER)	K.A
<p>THIS DRAWING SUPERSEDES ALL ITS PREVIOUS ISSUES BEARING LOWER REVISION NUMBERS.</p>			

DRG. TITLE:
**FIRST FLOOR REINFORCEMENT PLAN
@ LEV. +14'-3"**

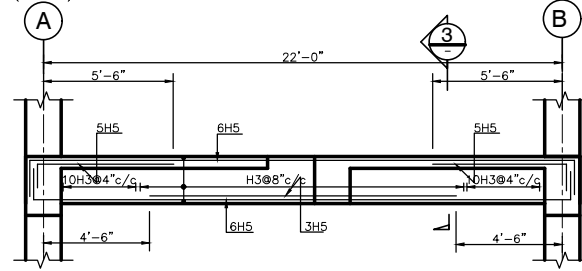
DRAWN	FARHAN SHAMM	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	BA/CC/JS-11
DATE	JAN. '19	REV.	0



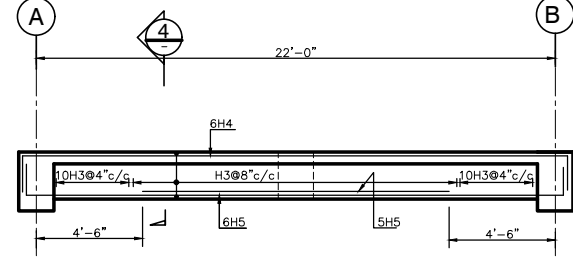
ELEVATION OF FB-1
(9'x18") SCALE: 3/8"=1'-0"



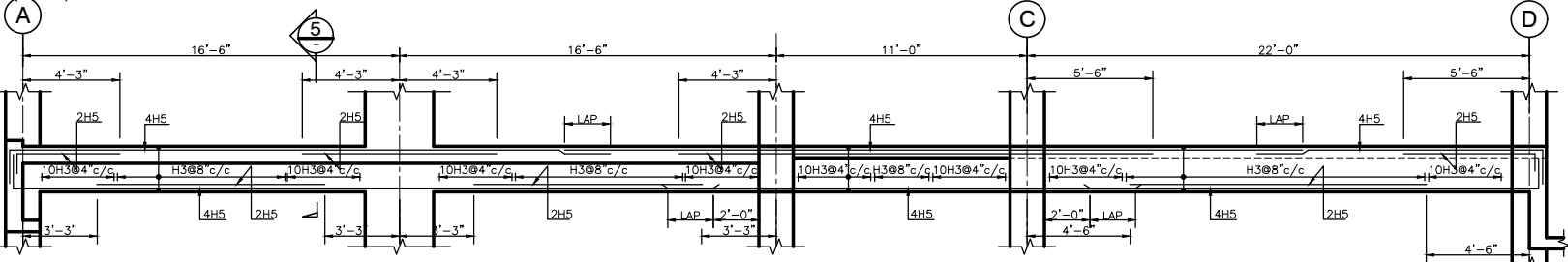
ELEVATION OF FB-1A
(9'x18") SCALE: 3/8"=1'-0"



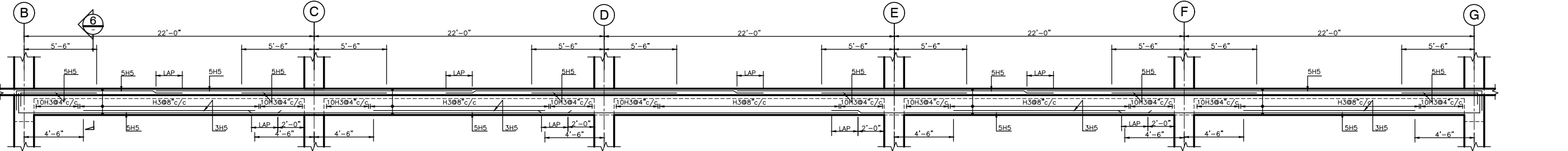
ELEVATION OF FB-2
(18'x18") SCALE: 3/8"=1'-0"



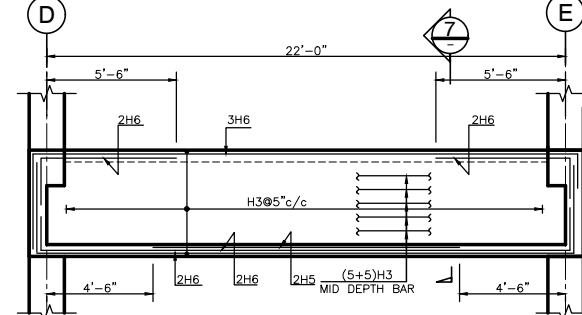
ELEVATION OF FB-3
(18'x18") SCALE: 3/8"=1'-0"



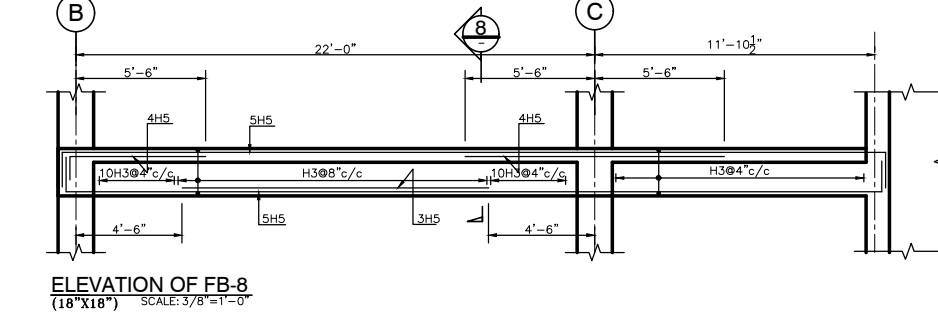
ELEVATION OF FB-5
(18'x18") SCALE: 3/8"=1'-0"



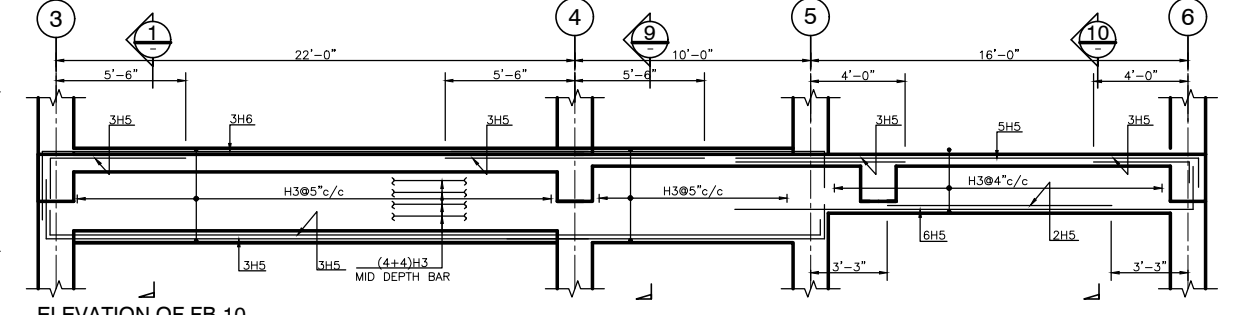
ELEVATION OF FB-4
(18'x18") SCALE: 3/8"=1'-0"



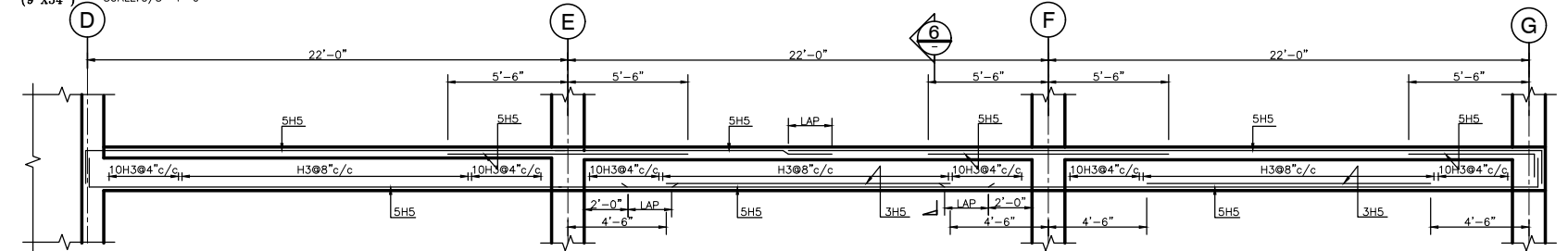
ELEVATION OF FB-6
(9'x18") SCALE: 3/8"=1'-0"



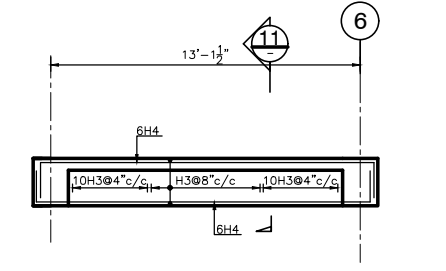
ELEVATION OF FB-8
(18'x18") SCALE: 3/8"=1'-0"



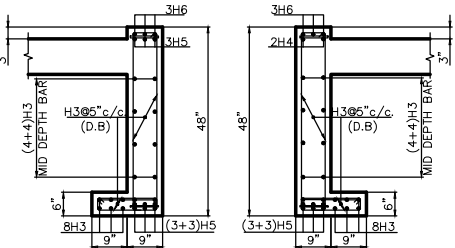
ELEVATION OF FB-10
(9'x18/18"x24") SCALE: 3/8"=1'-0"



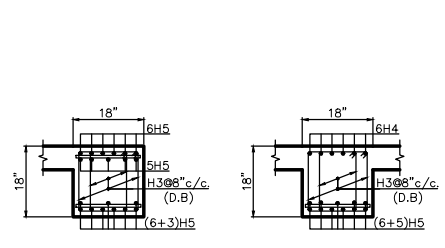
ELEVATION OF FB-9
(18'x18") SCALE: 3/8"=1'-0"



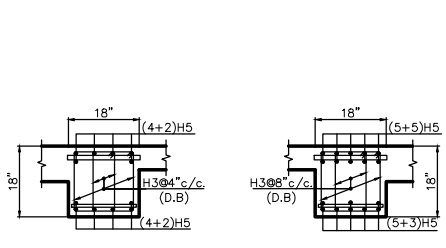
ELEVATION OF FB-11
(18'x18") SCALE: 3/8"=1'-0"



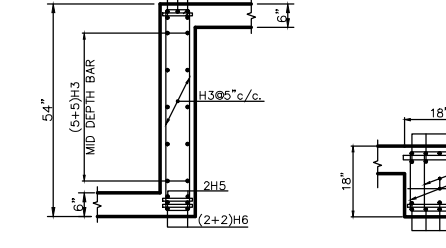
1 SECTION
SCALE: 3/4"=1'-0"



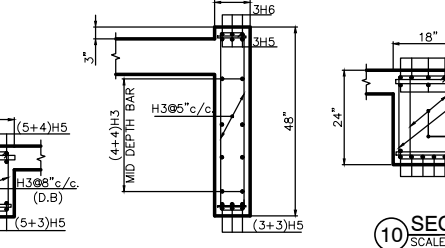
2 SECTION
SCALE: 3/4"=1'-0"



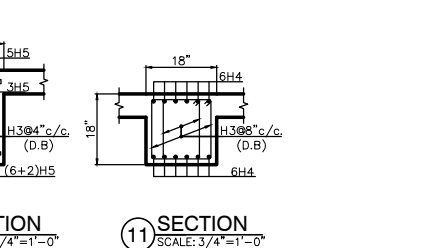
3 SECTION
SCALE: 3/4"=1'-0"



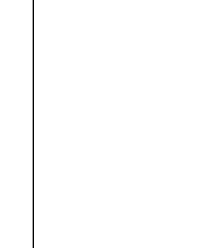
4 SECTION
SCALE: 3/4"=1'-0"



5 SECTION
SCALE: 3/4"=1'-0"



6 SECTION
SCALE: 3/4"=1'-0"



7 SECTION
SCALE: 3/4"=1'-0"

8 SECTION
SCALE: 3/4"=1'-0"

9 SECTION
SCALE: 3/4"=1'-0"

10 SECTION
SCALE: 3/4"=1'-0"

11 SECTION
SCALE: 3/4"=1'-0"

NOTE: - FOR GENERAL NOTES REFER DRG. NO. IBA/CAJ/01-01.

PROJECT : **IBA COMMUNITY COLLEGE JACOBABAD**

ARCHITECT : **HABIB FIDA ALI**
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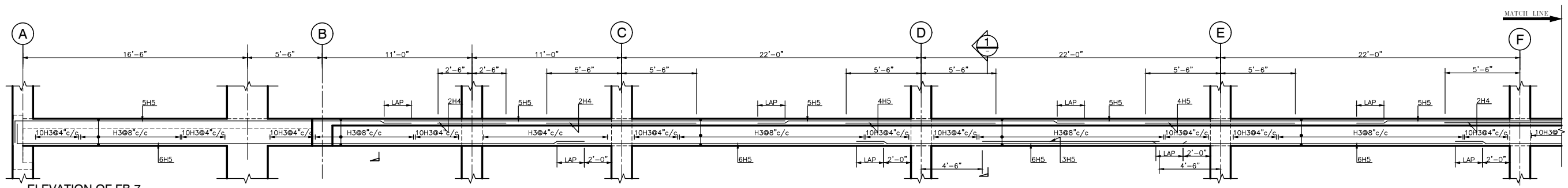
CONSULTANT : **Loya associates**
CONSULTING ENGINEERS, ARCHITECTS & PLANNERS
100-C, Block-2, P.E.C.E.S.Off Sharae Faisal/Shahrah-e-Quaidon
P.O. Box No.18633, Karachi-76400, Pakistan. Phone: (99-21)4030100-48,
Fax : (99-21)4034088, Email: info@loyaassociates.com,
URL : www.loyaassociates.com

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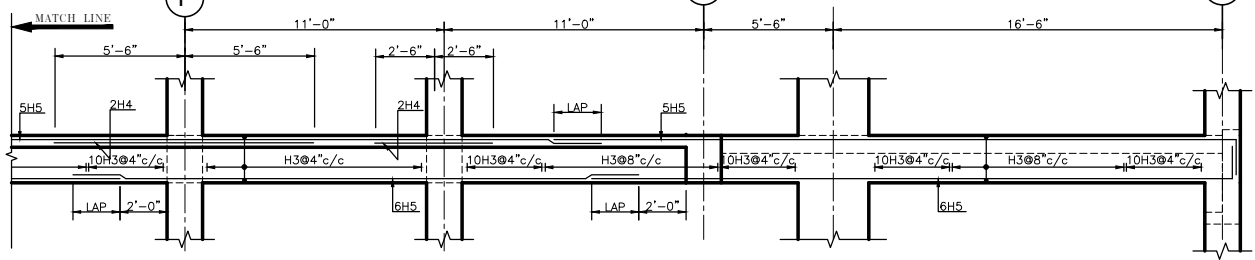
DRG. TITLE : **1st FLOOR BEAM ELEVATION & SECTIONS @ LEV.+14'-3"**

DRWN	FARHAN SHAMSI	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CCJS-12
DATE	JAN '19	REV.	0

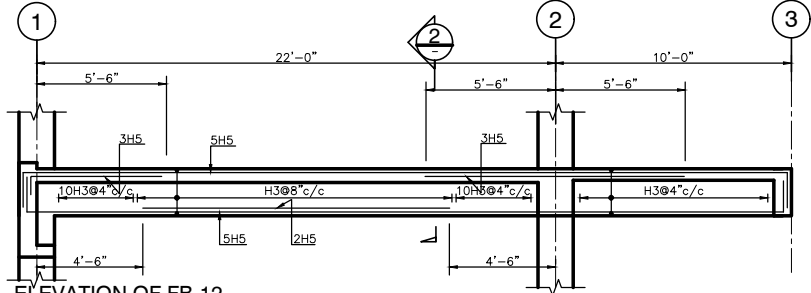
(SHEET-1)



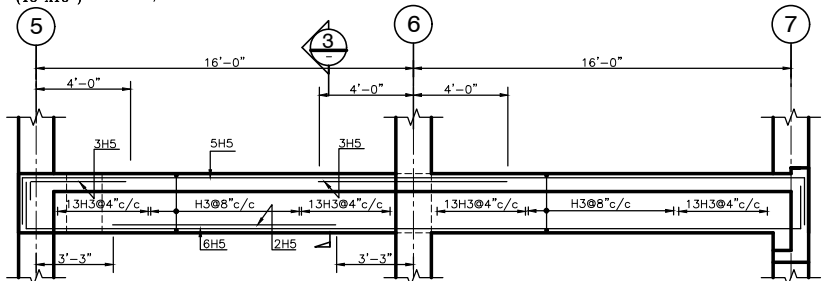
ELEVATION OF FB-7
(18'x18') SCALE: 3/8"=1'-0"



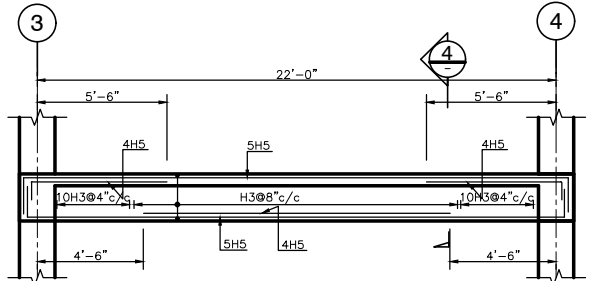
ELEVATION OF FB-7
(18'x18') SCALE: 3/8"=1'-0"



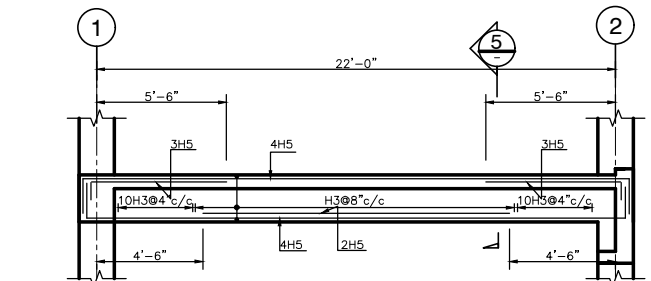
ELEVATION OF FB-12
(18'x18') SCALE: 3/8"=1'-0"



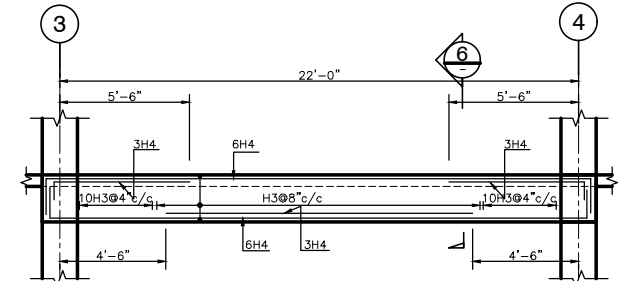
ELEVATION OF FB-13
(18'x24') SCALE: 3/8"=1'-0"



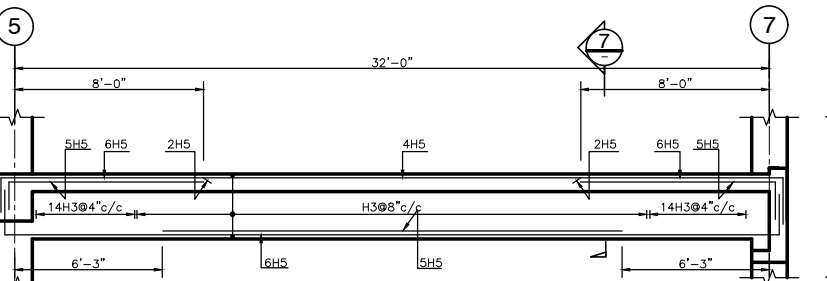
ELEVATION OF FB-14
(18'x18') SCALE: 3/8"=1'-0"



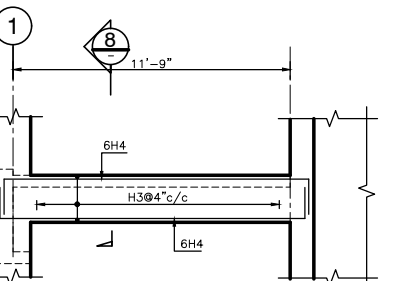
ELEVATION OF FB-15
(18'x18') SCALE: 3/8"=1'-0"



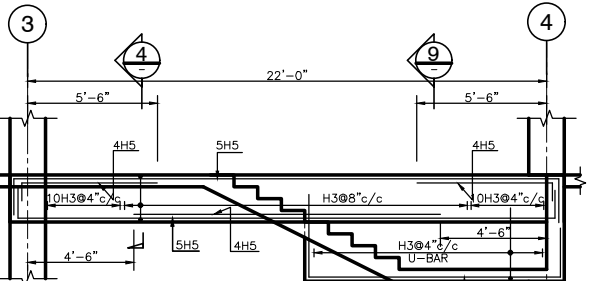
ELEVATION OF FB-16
(18'x18') SCALE: 3/8"=1'-0"



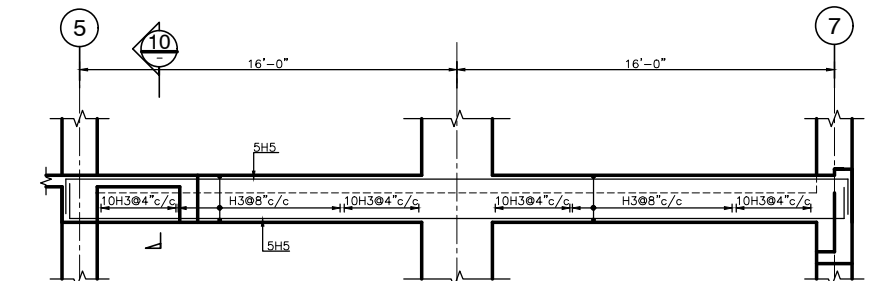
ELEVATION OF FB-17
(18'x27') SCALE: 3/8"=1'-0"



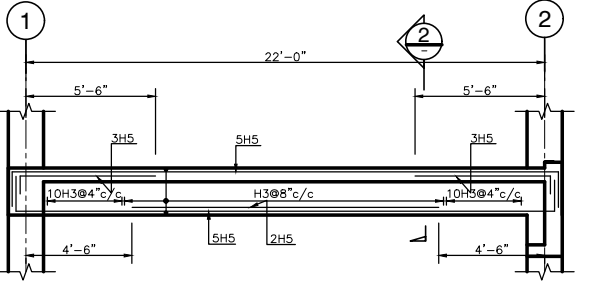
ELEVATION OF FB-18
(18'x18') SCALE: 3/8"=1'-0"



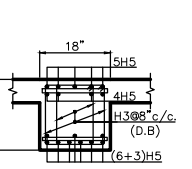
ELEVATION OF FB-19
(18'x18'/9'x36') SCALE: 3/8"=1'-0"



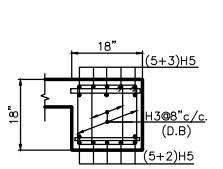
ELEVATION OF FB-20
(18'x18') SCALE: 3/8"=1'-0"



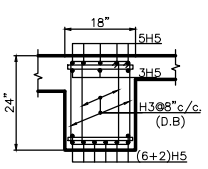
ELEVATION OF FB-21
(18'x18') SCALE: 3/8"=1'-0"



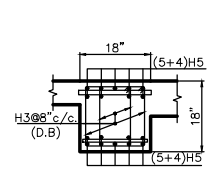
SECTION 1
SCALE: 3/4"=1'-0"



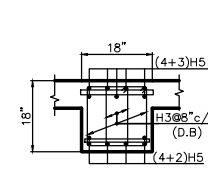
SECTION 2
SCALE: 3/4"=1'-0"



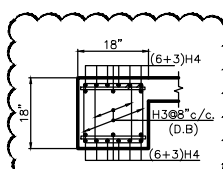
SECTION 3
SCALE: 3/4"=1'-0"



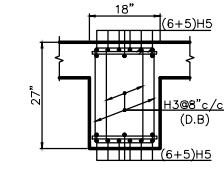
SECTION 4
SCALE: 3/4"=1'-0"



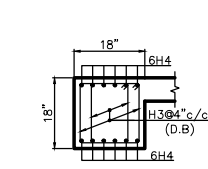
SECTION 5
SCALE: 3/4"=1'-0"



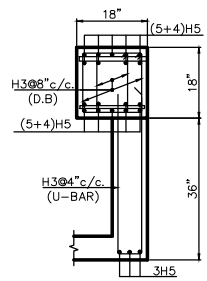
SECTION 6
SCALE: 3/4"=1'-0"



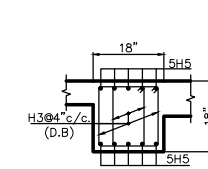
SECTION 7
SCALE: 3/4"=1'-0"



SECTION 8
SCALE: 3/4"=1'-0"



SECTION 9
SCALE: 3/4"=1'-0"



SECTION 10
SCALE: 3/4"=1'-0"

NOTE: 1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CA/04-01. FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

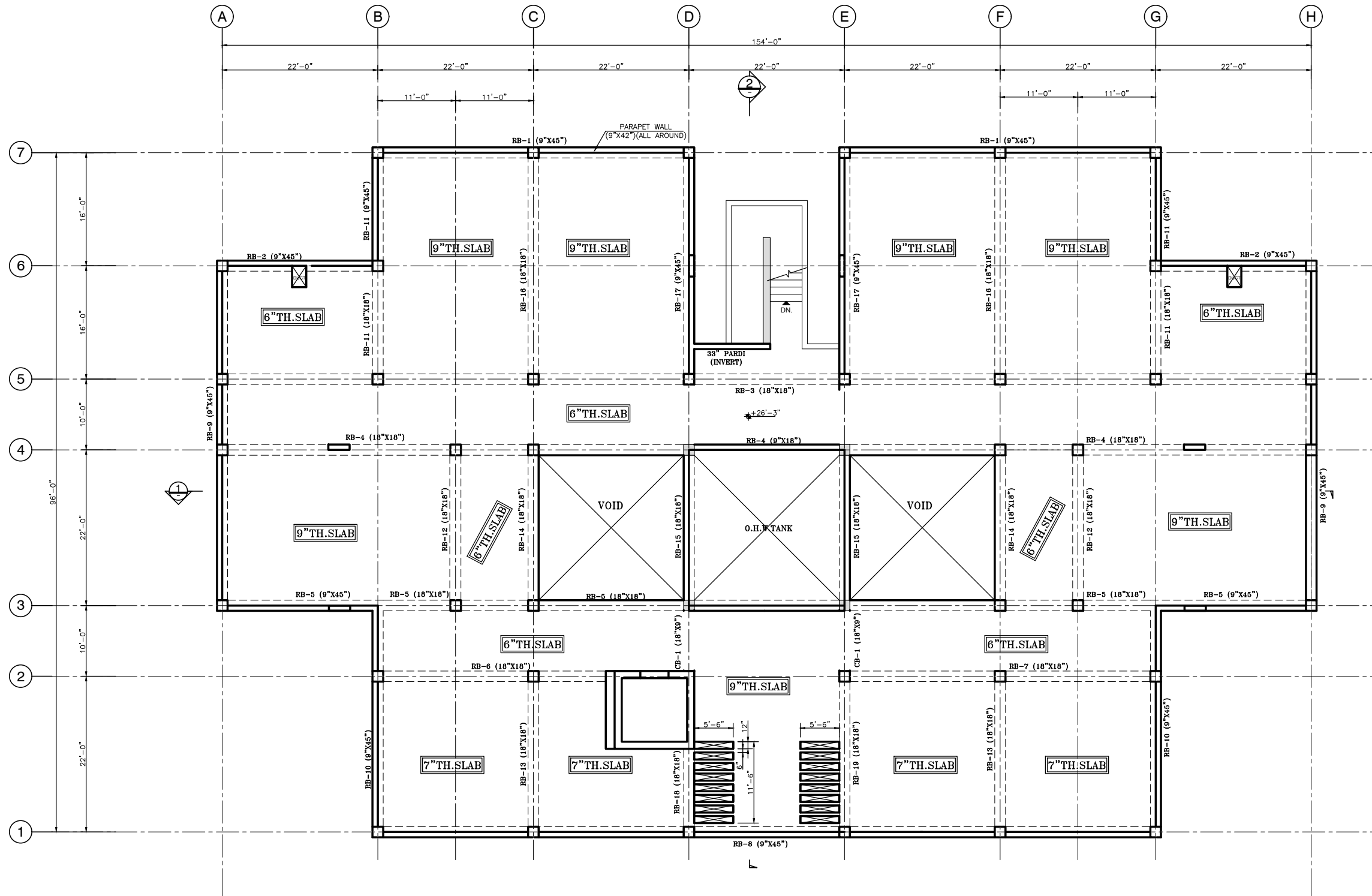
ARCHITECT:
HABIB FIDA ALI
4 CH. KHALIQUIZZAMAN ROAD, KARACHI 75530
TEL: 5661 683, 5661 684, FAX: 92-21-5686891

CONSULTANT:
Loya associates
CONSULTING ENGINEERS, ARCHITECTS & PLANNERS
100-C, Block-2, P.E.C.H.S.Off Sharea Faisal/Shahrah-e-Quaidoon
P.O. Box No.18633, Karachi-76400, Pakistan. Phone: (99-21)4036100-48,
Fax : (99-21)4034088, Email: info@loyaassociates.com,
URL : www.loyaassociates.com

REV	DATE	DESCRIPTION	APPROVED
0	18-01-19	FIRST ISSUE (FOR TENDER)	K.A

DRG. TITLE:
**1st FLOOR BEAM ELEVATION & SECTIONS
@ LEV. +14'-3"**
(SHEET-2)

DRWN	FARHAN SHAMSI	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CC/JIS-13
DATE	JAN '19	REV.	0



ROOF FRAMING PLAN @ LEV. +26'-3"
SCALE: 3/16" = 1'-0"

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CCJ/01-01. FOR TENDER

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

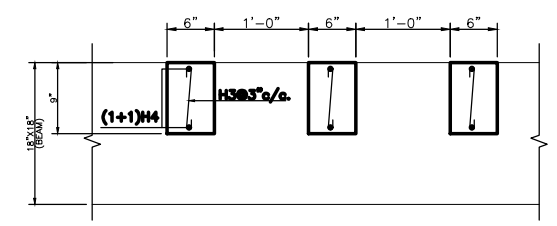
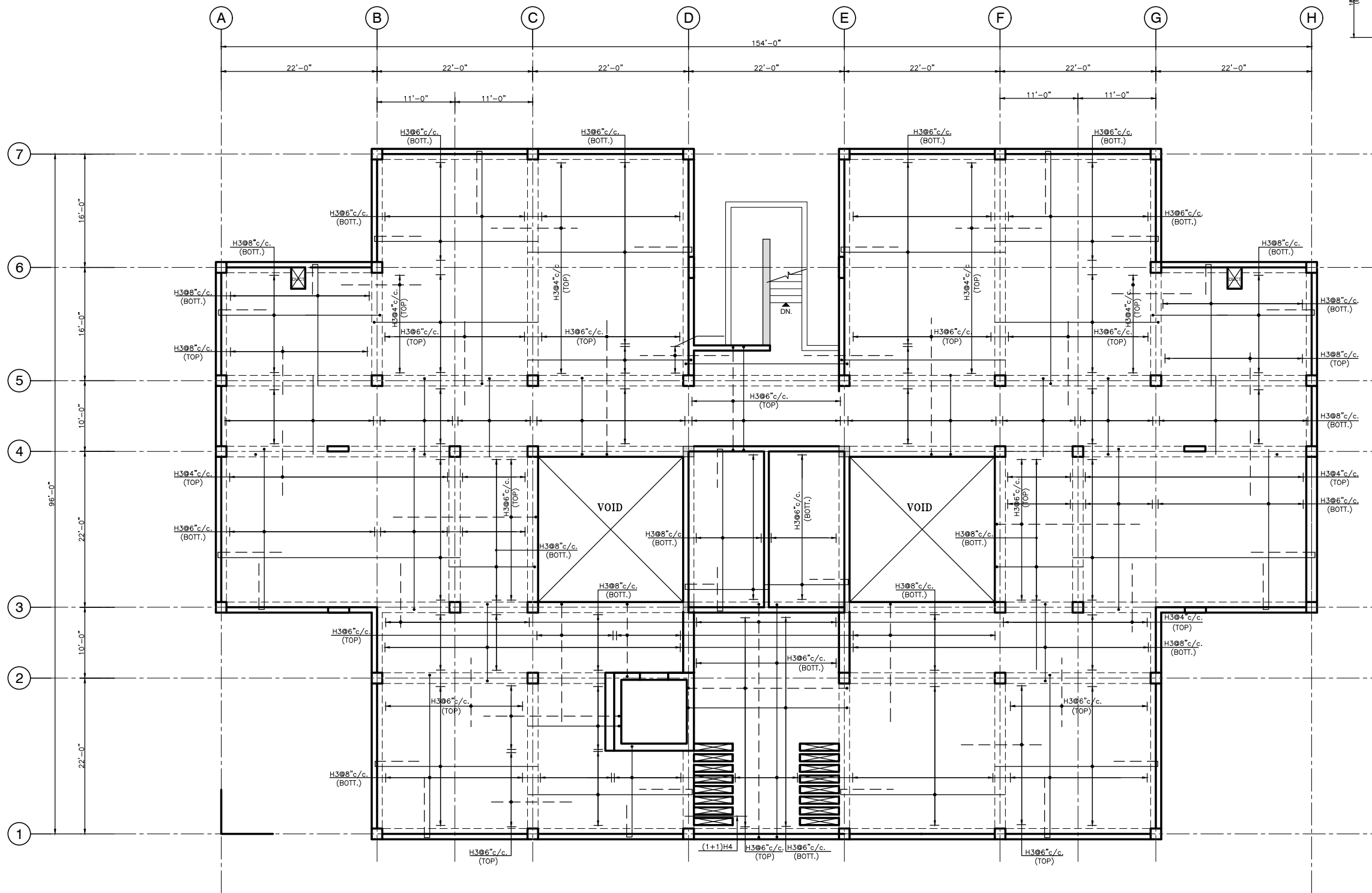
ARCHITECT:
HABIB FIDA ALI
4 CH, KHALIQUIZZAMAN ROAD, KARACHI 75530
TEL: 5661683,5661684, FAX:92-21-5686891

CONSULTANT:
Loya associates
CONSULTING ENGINEERS, ARCHITECTS & PLANNERS
100-C, Block-2, P.E.C.H.S.Off Sharae Faisal/Shahrah-e-Quaidoon
P.O. Box No.18633, Karachi-75400, Pakistan. Phone:(92-21)4036100-45,
Fax : (92-21)4034086, Email:info@loyassociates.com,
URL : www.loyassociates.com

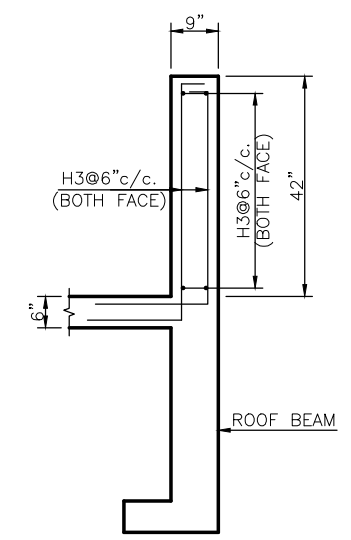
REV	DATE	DESCRIPTION	APPROVED
0	17-09-21	FIRST ISSUE (FOR TENDER)	K.A

DRG. TITLE:
**ROOF FRAMING PLAN
@ LEV. +26'-3"**

DRAWN	MAGDEM RAHAT	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CCJ/S-14
DATE	SEPT. '21	REV.	0



TYP SECTION OF RIB
SCALE: 2'-1"=0"



TYP SECTION OF PARAPET WALL
(ALL AROUND) SCALE: 1'-1"=0"

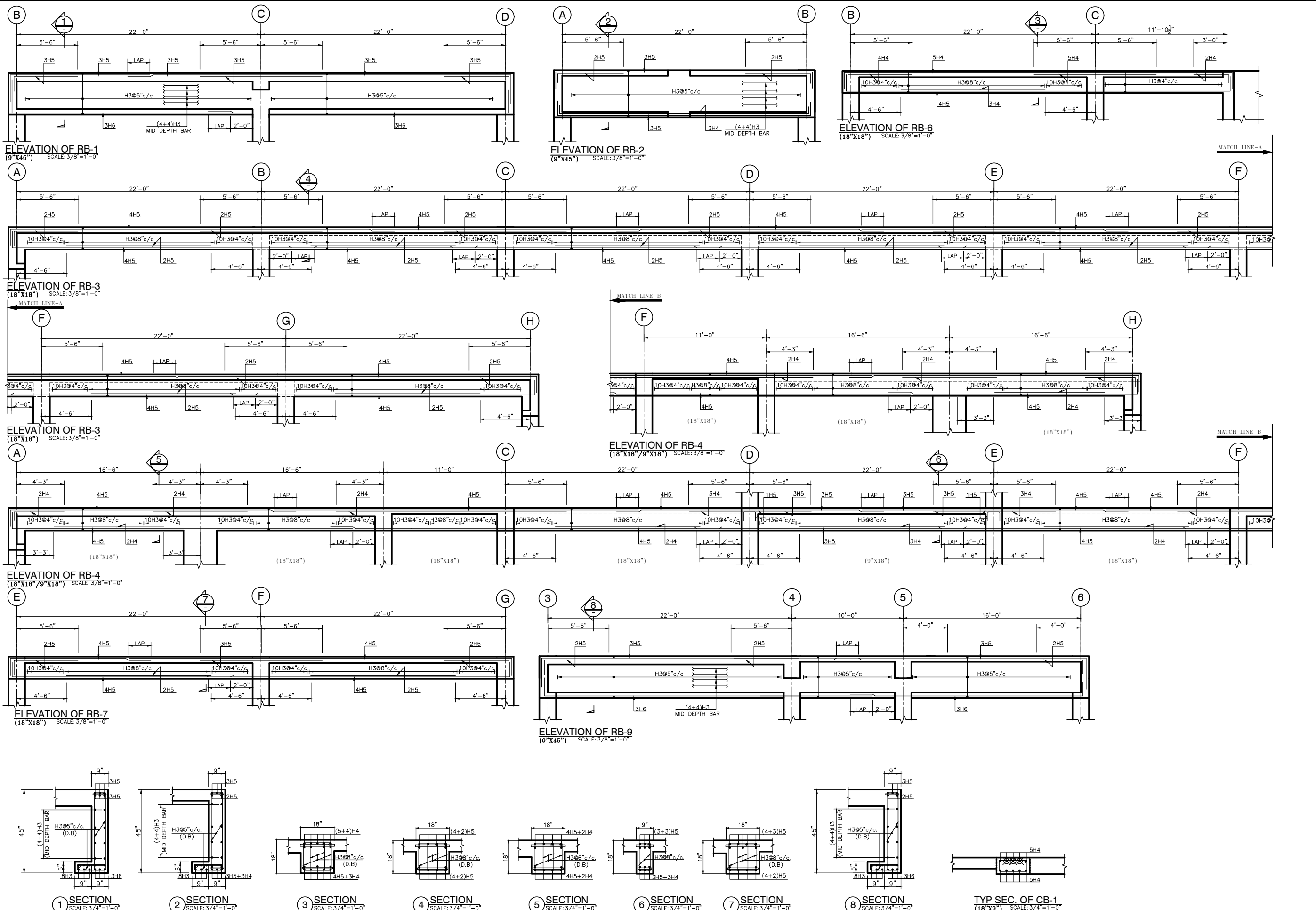
ROOF REINFORCEMENT PLAN @ LEV. +26'-3"
SCALE: 3/16"=1'-0"

NOTE:
TOP DISTRIBUTION STEEL NOT SHOWN IN PLAN
PROVIDE H309 c/c. WHEREVER REQUIRED.

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/04/01-01.

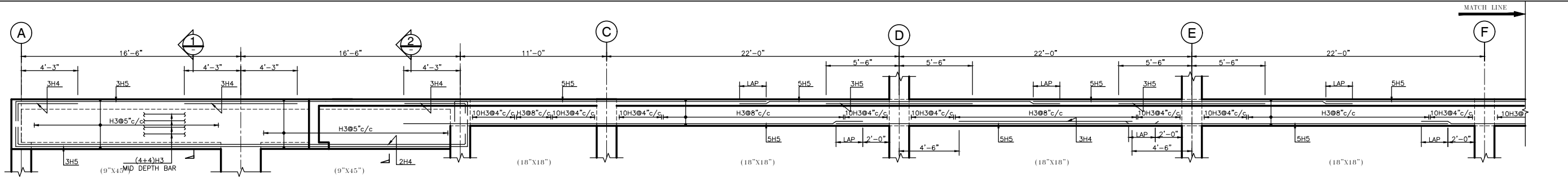
FOR TENDER

PROJECT :	ARCHITECT :	CONSULTANT :	DRG. TITLE :	DRAWN	FARHAN SHAMM	SCALE	AS SHOWN
				CHECKED	A.F.	JOB NO.	19/18
IBA COMMUNITY COLLEGE JACOBABAD	HABIB FIDA ALI 4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530 TEL: 5661683,5661684, FAX:92-21-5686891	Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 100-C, Block-2, P.E.C.H.S.Off Sharea Faisal/Shafrak-e-Quaidon P.O. Box No.18633,Karachi-76400,Pakistan.Phone:(92-21)4836100-48, Fax : (92-21)4834086, Email:info@loyaassociates.com, URL : www.loyaassociates.com	ROOF REINFORCEMENT PLAN @ LEV. +26'-3"	APPROVED	K.A.	DRG NO.	IBA/CC/JS-15
				DATE	JAN '19	REV.	0

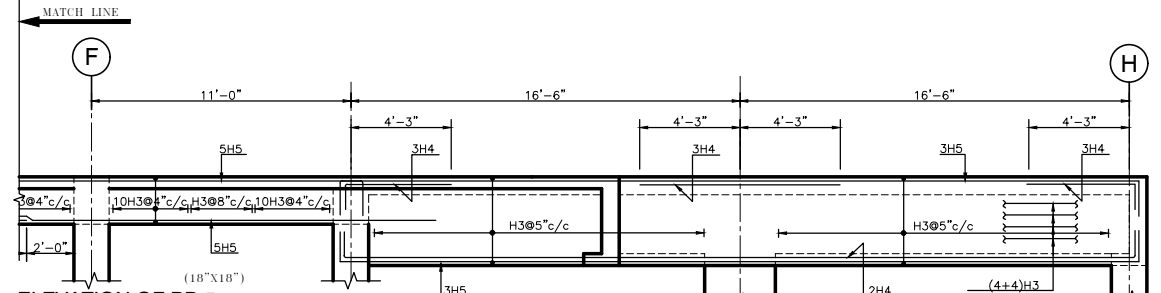


NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/04/01-01.

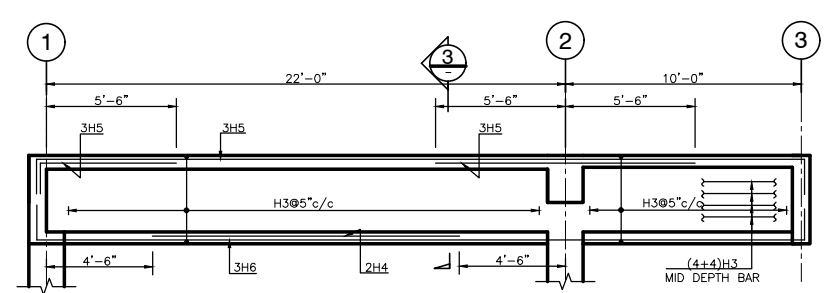
PROJECT :	ARCHITECT :	CONSULTANT :	DRG. TITLE :	DATE :	REV :	DESCRIPTION :	APPROVED :	DATE :	REVISION :
IBA COMMUNITY COLLEGE JACOBABAD	HABIB FIDA ALI 4 CH, KHALIQUIZZAMAN ROAD, KARACHI 75530 TEL: 5661 683, 5661 684, FAX: 92-21-5686891	Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 180-C, Block-2, P.E.C.H.S.Off Sharae Faisal/Shahrah-e-Quaidoon P.O. Box No.18633, Karachi-75400, Pakistan. Phone: (92-21)4036100-48, Fax : (92-21)4034088, Email: info@loyaassociates.com, URL : www.loyaassociates.com	ROOF BEAM ELEVATION & SECTIONS @ LEV. +26'-3"	18-01-19	0	FIRST ISSUE (FOR TENDER)	K.A.		
				FOR TENDER					
				DRAWN :		SCALE :		AS SHOWN	
				CHECKED :		JOB NO. :		19/18	
				APPROVED :		DRG NO. :		IBA/CC/JIS-16	
				DATE :		REV. :		0	



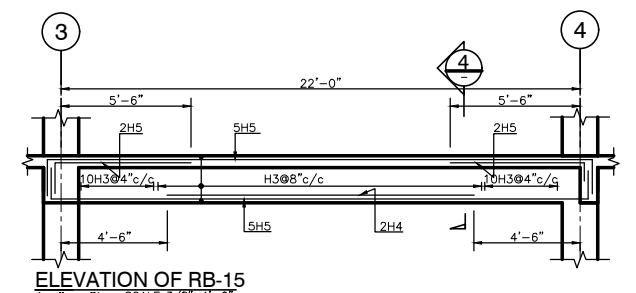
ELEVATION OF RB-5
(9'x45'/18'x18') SCALE: 3/8"=1'-0"



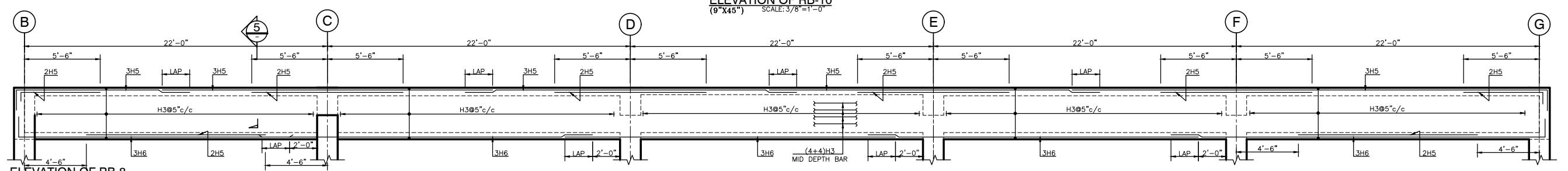
ELEVATION OF RB-5
(9'x45'/18'x18') SCALE: 3/8"=1'-0"



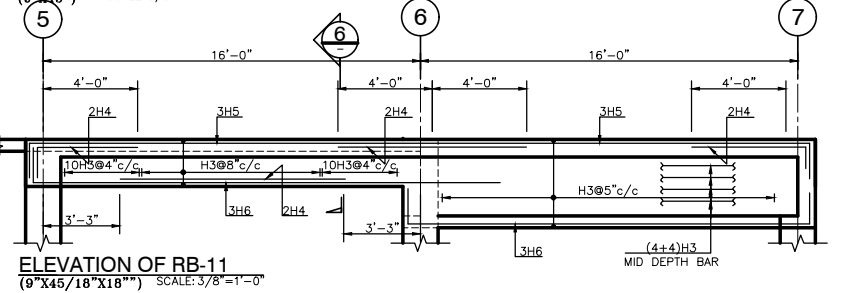
ELEVATION OF RB-10
(9'x45') SCALE: 3/8"=1'-0"



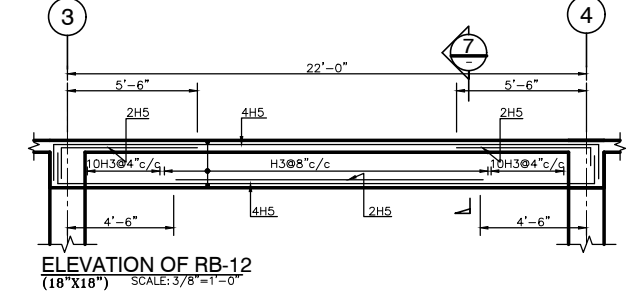
ELEVATION OF RB-15
(18'x18') SCALE: 3/8"=1'-0"



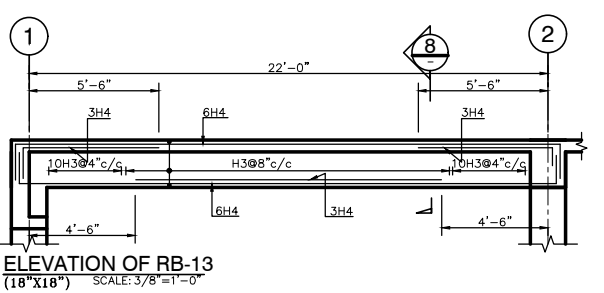
ELEVATION OF RB-8
(9'x45') SCALE: 3/8"=1'-0"



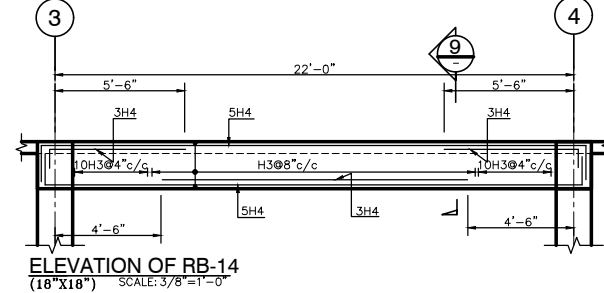
ELEVATION OF RB-11
(9'x45'/18'x18') SCALE: 3/8"=1'-0"



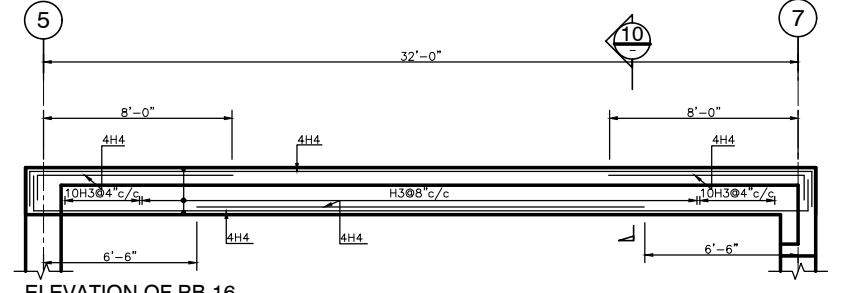
ELEVATION OF RB-12
(18'x18') SCALE: 3/8"=1'-0"



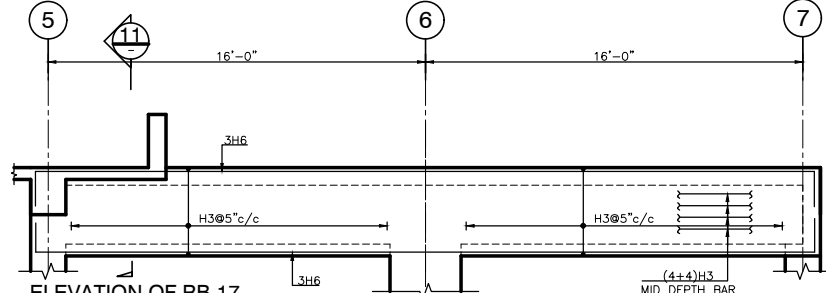
ELEVATION OF RB-13
(18'x18') SCALE: 3/8"=1'-0"



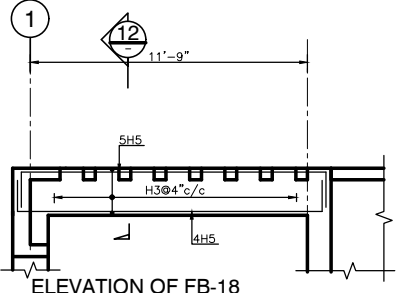
ELEVATION OF RB-14
(18'x18') SCALE: 3/8"=1'-0"



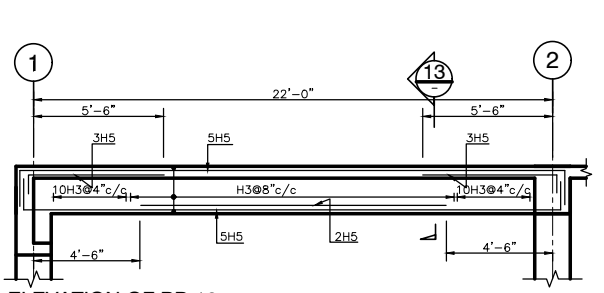
ELEVATION OF RB-16
(18'x18') SCALE: 3/8"=1'-0"



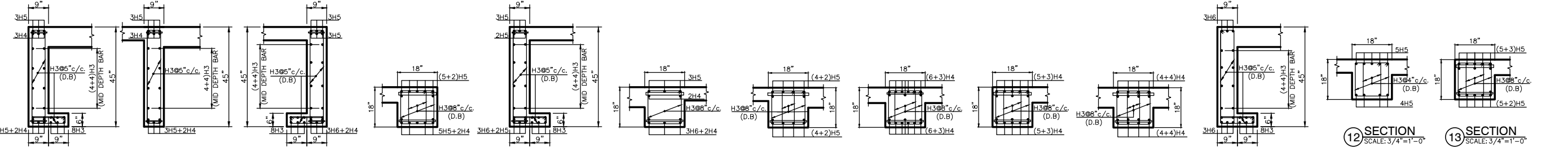
ELEVATION OF RB-17
(9'x45') SCALE: 3/8"=1'-0"



ELEVATION OF RB-18
(18'x18') SCALE: 3/8"=1'-0"



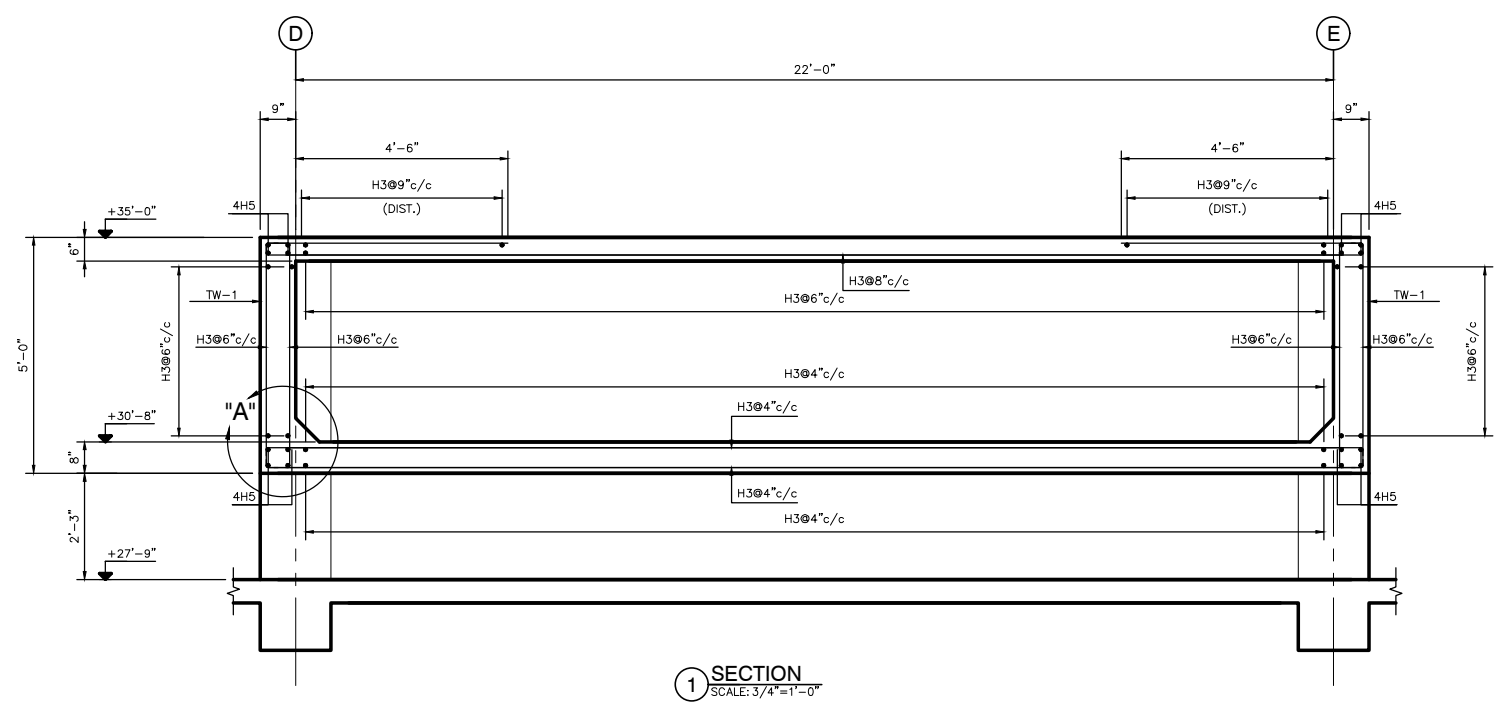
ELEVATION OF RB-19
(18'x18') SCALE: 3/8"=1'-0"



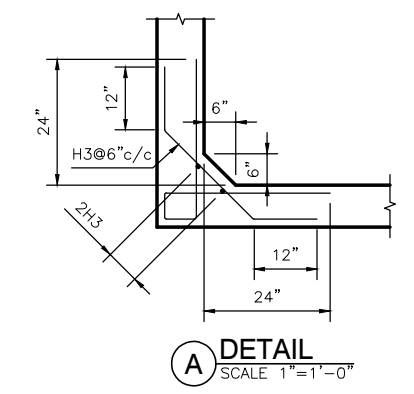
1 SECTION SCALE: 3/4"=1'-0" 2 SECTION SCALE: 3/4"=1'-0" 3 SECTION SCALE: 3/4"=1'-0" 4 SECTION SCALE: 3/4"=1'-0" 5 SECTION SCALE: 3/4"=1'-0" 6 SECTION SCALE: 3/4"=1'-0" 7 SECTION SCALE: 3/4"=1'-0" 8 SECTION SCALE: 3/4"=1'-0" 9 SECTION SCALE: 3/4"=1'-0" 10 SECTION SCALE: 3/4"=1'-0" 11 SECTION SCALE: 3/4"=1'-0" 12 SECTION SCALE: 3/4"=1'-0" 13 SECTION SCALE: 3/4"=1'-0"

NOTE: 1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CC/JN-01. FOR TENDER

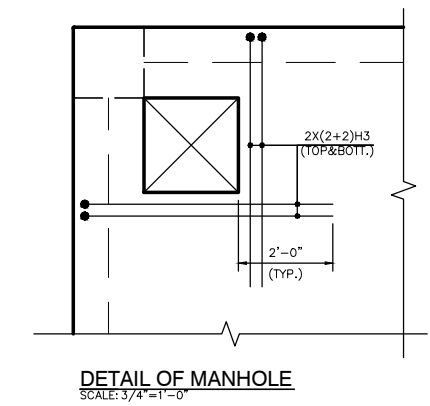
PROJECT :	ARCHITECT :	CONSULTANT :	DRG. TITLE :	DRG. NO. :
IBA COMMUNITY COLLEGE JACOBABAD	HABIB FIDA ALI 4 CH. KHALIQUZZAMAN ROAD, KARACHI 75530 TEL: 5661683,5661684, FAX:92-21-5686891	Loya associates CONSULTING ENGINEERS, ARCHITECTS & PLANNERS 100-C, Block-2, P.E.C.E.S.Off Sharae Faisal/Shahrah-e-Quaiden P.O. Box No.18633,Karachi-75400,Pakistan.Phone:(92-21)4030100-48, Fax : (92-21)4034088, Email:info@loyaassociates.com, URL : www.loyaassociates.com	ROOF BEAM ELEVATION & SECTIONS @ LEV. +26'-3"	IBA/CC/JN-17
DATE :	DATE :	DATE :	DATE :	DATE :
10-01-19	10-01-19	10-01-19	10-01-19	10-01-19
DESCRIPTION :	DESCRIPTION :	DESCRIPTION :	DESCRIPTION :	DESCRIPTION :
FIRST ISSUE (FOR TENDER)	FIRST ISSUE (FOR TENDER)	FIRST ISSUE (FOR TENDER)	FIRST ISSUE (FOR TENDER)	FIRST ISSUE (FOR TENDER)
APPROVED :	APPROVED :	APPROVED :	APPROVED :	APPROVED :
K.A.	K.A.	K.A.	K.A.	K.A.
SCALE :	SCALE :	SCALE :	SCALE :	SCALE :
AS SHOWN	AS SHOWN	AS SHOWN	AS SHOWN	AS SHOWN
JAN '19	JAN '19	JAN '19	JAN '19	JAN '19
REV. :	REV. :	REV. :	REV. :	REV. :
0	0	0	0	0



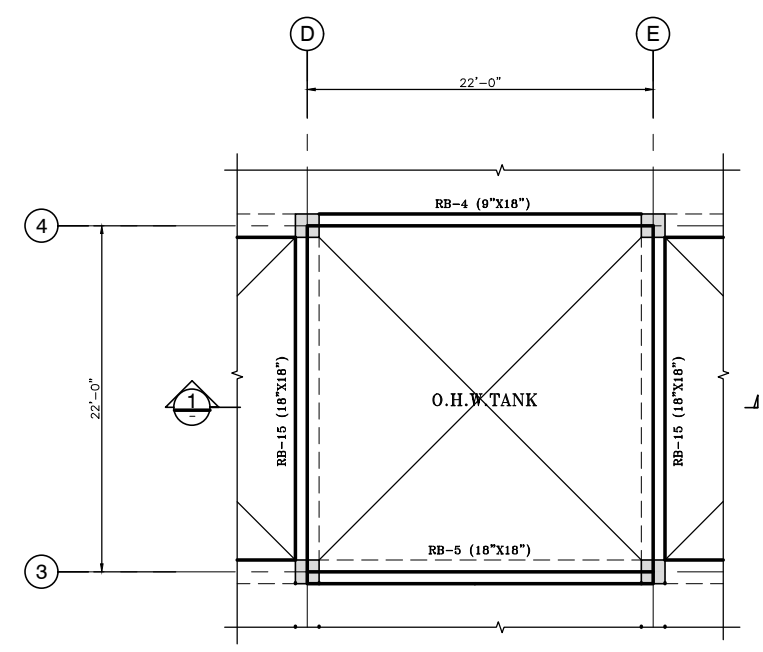
1 SECTION
SCALE: 3/4"=1'-0"



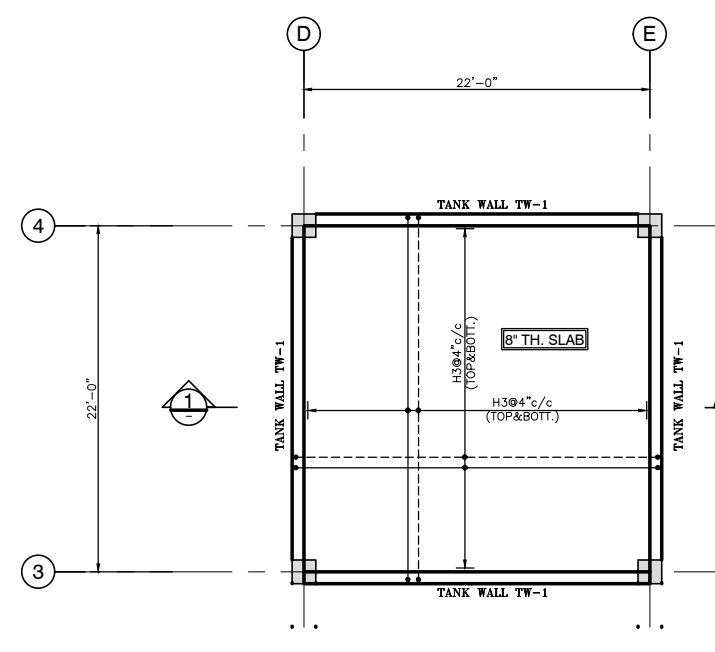
A DETAIL
SCALE: 1"=1'-0"



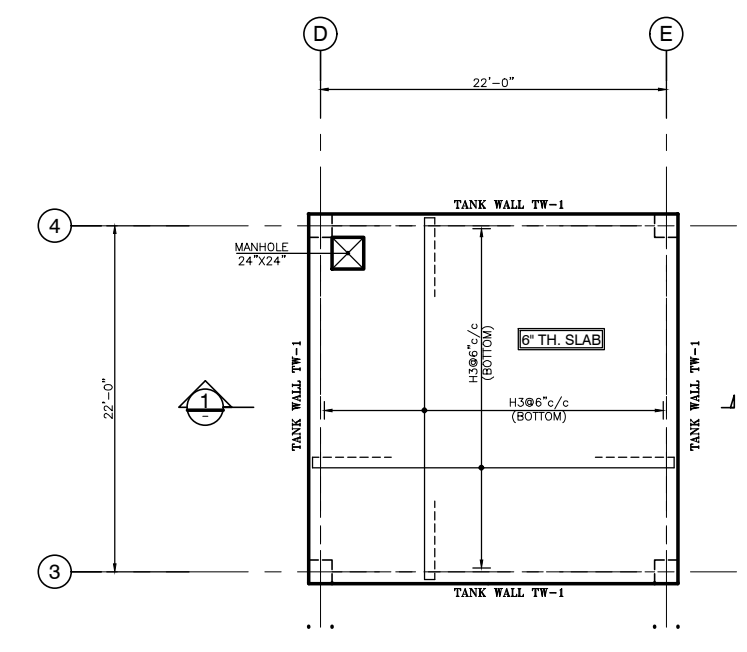
DETAIL OF MANHOLE
SCALE: 3/4"=1'-0"



PART ROOF FRAMING PLAN @ LEV. +26'-3"
SCALE: 1/4"=1'-0"



BOTTOM SLAB PLAN OF O/H. W. TANK
SCALE: 1/4"=1'-0"



TOP SLAB PLAN OF O/H. W. TANK
SCALE: 1/4"=1'-0"

NOTE:
1 - FOR GENERAL NOTES REFER DRG. NO. IBA/CCJ/01-01.

PROJECT :
**IBA COMMUNITY COLLEGE
JACOBABAD**

ARCHITECT:
HABIB FIDA ALI
4 CH, KHALIQUZZAMAN ROAD, KARACHI 75330
TEL: 5661 683, 5661 684, FAX: 92-21-5686891

CONSULTANT:
Loya associates
CONSULTING ENGINEERS, ARCHITECTS & PLANNERS
180-C, Block-2, P.E.C.H.S.Off Sharea Faisal/Shaheed-e-Quaid
P.O. Box No.18633, Karachi-75400, Pakistan. Phone: (92-21)4636100-48,
Fax : (92-21)4634086, Email: info@loyaassociates.com,
URL : www.loyaassociates.com

REV	DATE	DESCRIPTION	APPROVED
0	17-09-21	FIRST ISSUE (FOR TENDER)	K.A.

DRG. TITLE:
DETAILS OF O/H. W. TANK

DRWN	MADEEN RAHAT	SCALE	AS SHOWN
CHECKED	A.F.	JOB NO.	19/18
APPROVED	K.A.	DRG NO.	IBA/CCJ/S-18
DATE	SEPT. '21	REV.	0

FOR TENDER

STRUCTURAL DRAWINGS

FOR TENDER

SEPTEMBER 2021